# NASA Contractor Report 178416, Part 2

SPACE SHUTTLE PHASE B WIND TUNNEL MODEL AND TEST INFORMATION

VOLUME 3 - LAUNCH CONFIGURATION

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Military Public Electronic Systems
Michoud Engineering Office
New Orleans, Louisiana

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National Aeronautics and Space Administration

Langley Research Center Hampton, Virginia 23665 over odnik godenje bil Odnika kolimbija

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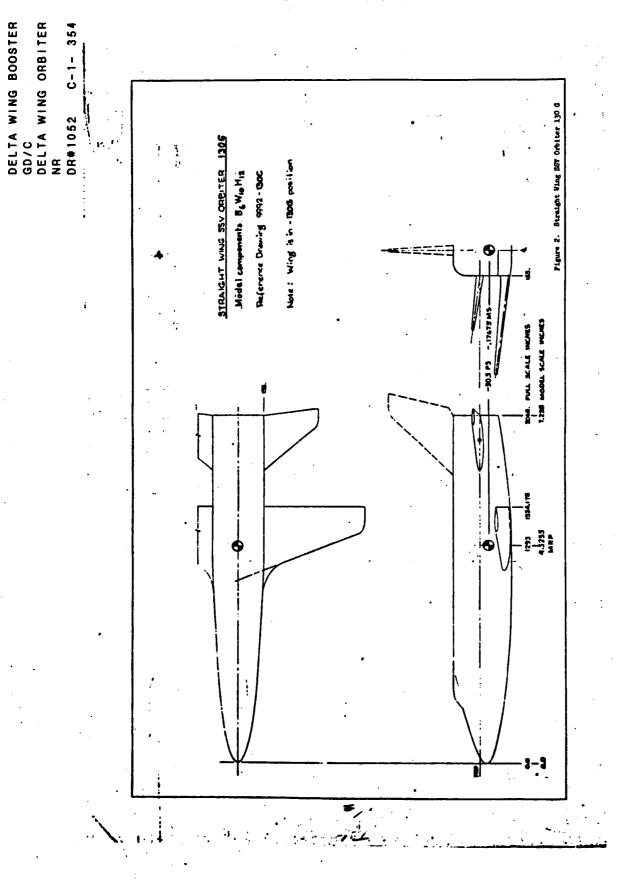
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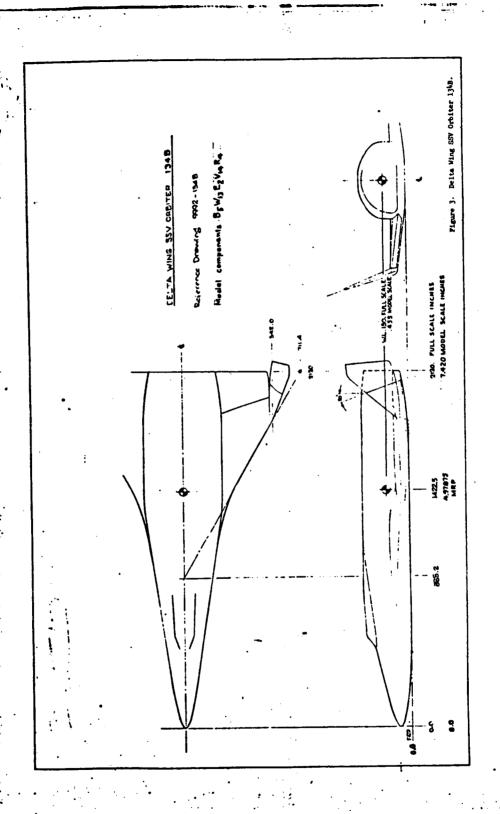
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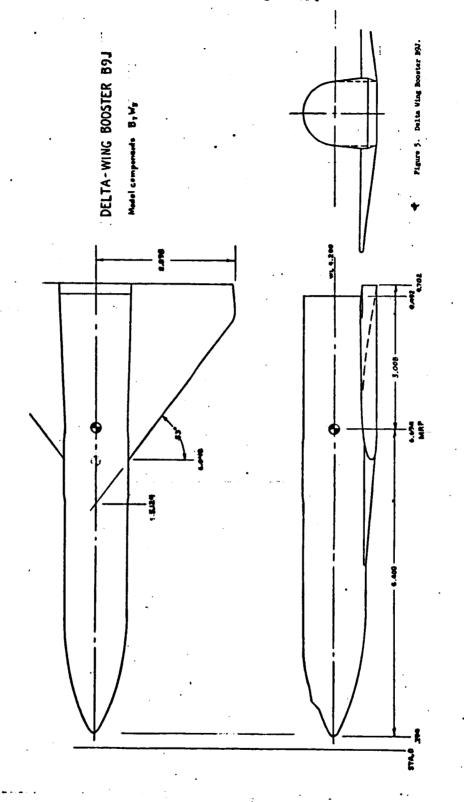
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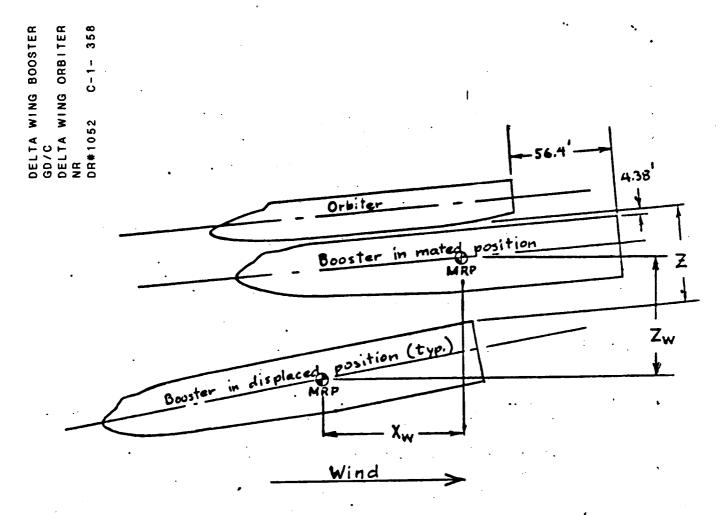
DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1052 C-1-355

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DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1052 C-1-357



In the mated position the fuselage reference planes were parallel, and the gaps between bodies and the base-to-base dimension were as noted. The same mated dimensions applied to all four combinations of the two boosters and the two orbiters. The dimensions are in feet, full scale.

With the booster in the displaced position that is snown, the displacement coordinates  $X_W$  and  $Z_W$  are positive.  $X_W$  and  $Z_W$  are the displacement coordinates of the moment reference point (MRP), for which see the general arrangement drawings.

Figure 6. Identification of the "mated" position and displacement Coordinates Z,  $X_{u}$ , and  $Z_{u}$ .

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C-1- 359

DR#1127

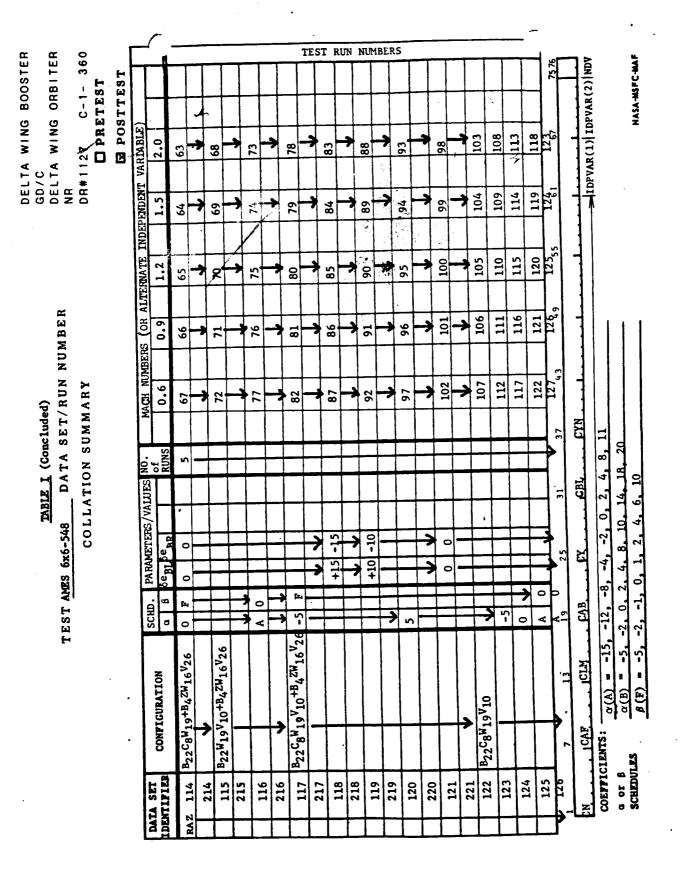
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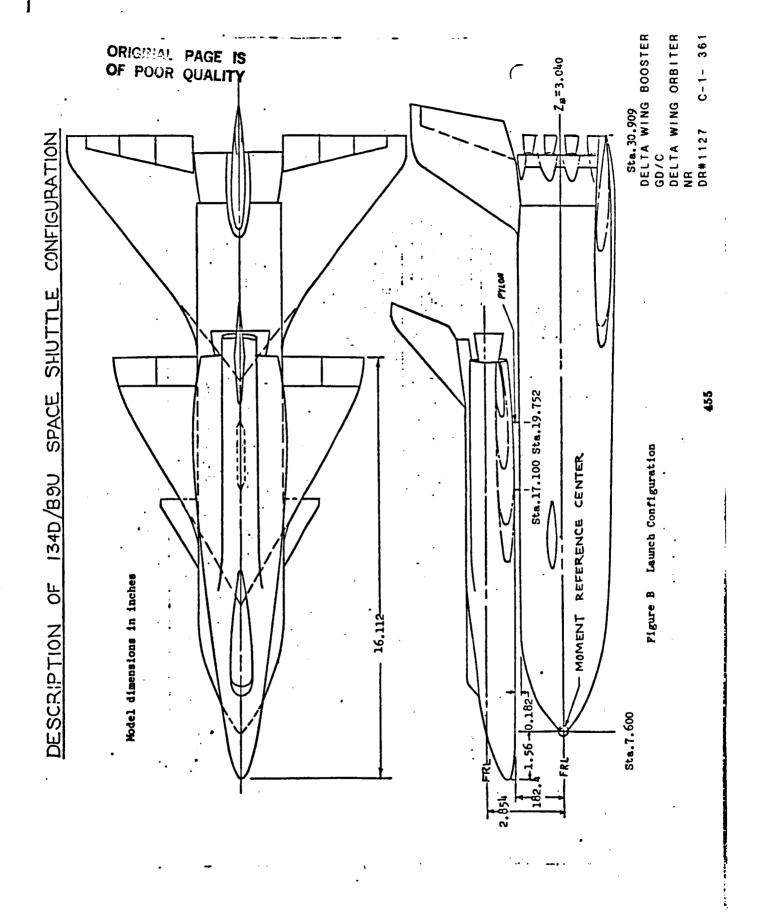
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TABLE I

COLLATION SUMMARY





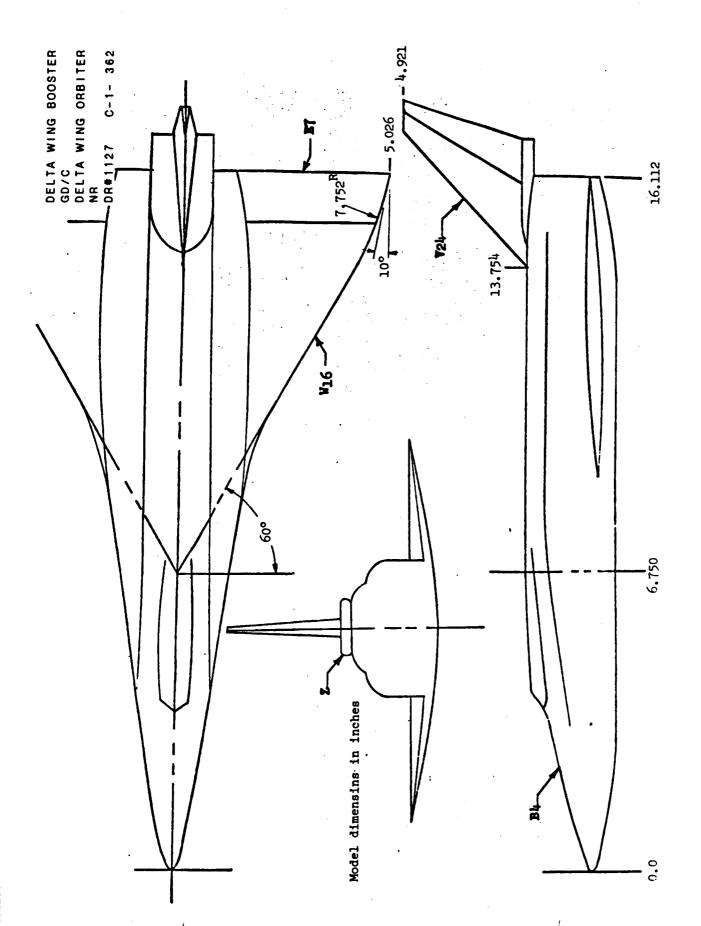
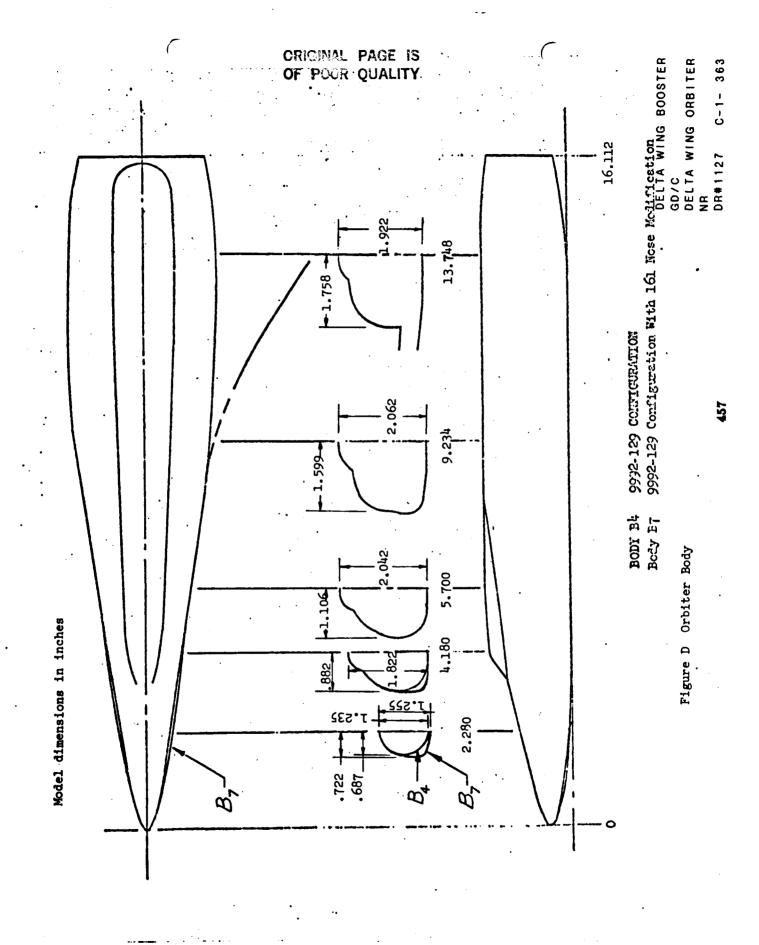
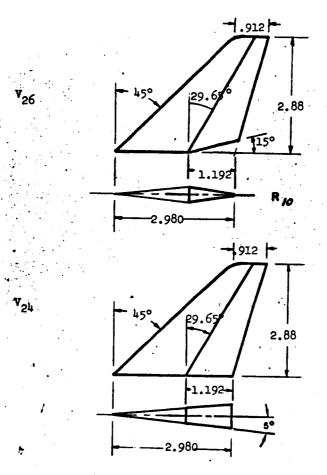


Figure C 3 View Delta Wing Orbiter





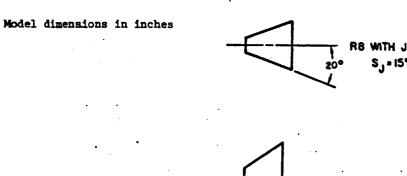


Figure E Flared Rudder, Delta Wing Orbiter

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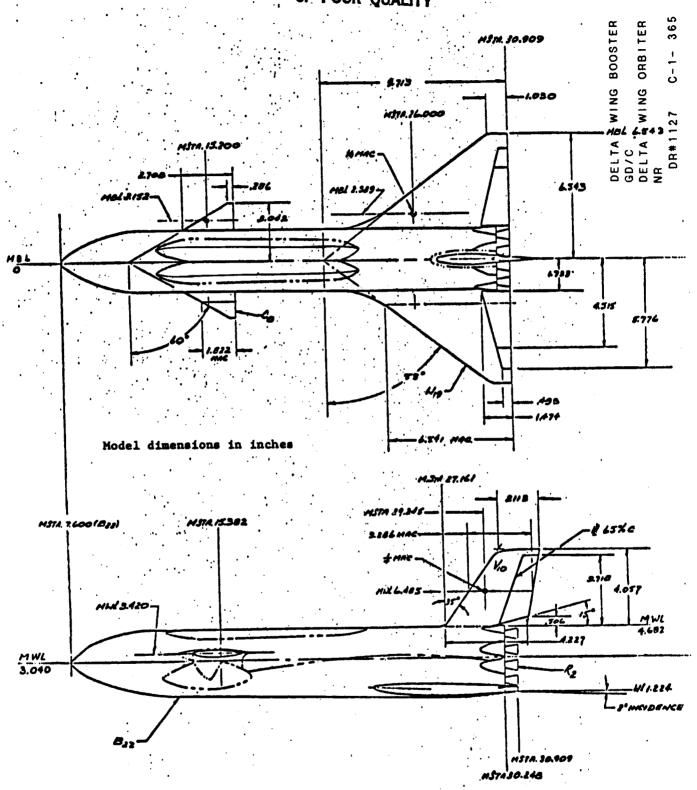


Figure F Delta Wing Booster

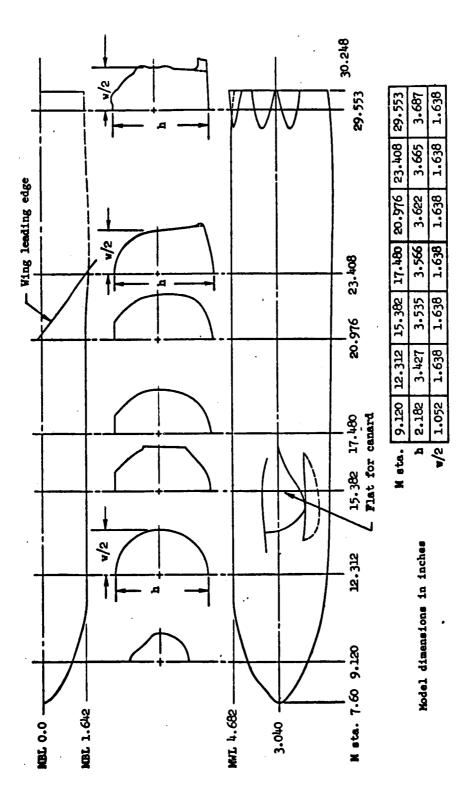
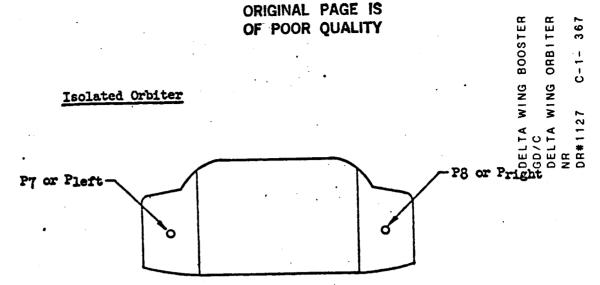


Figure G Booster Body

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## Isolated Orbiter



### Mated Orbiter

- P8 or Pright P7 or Pleft

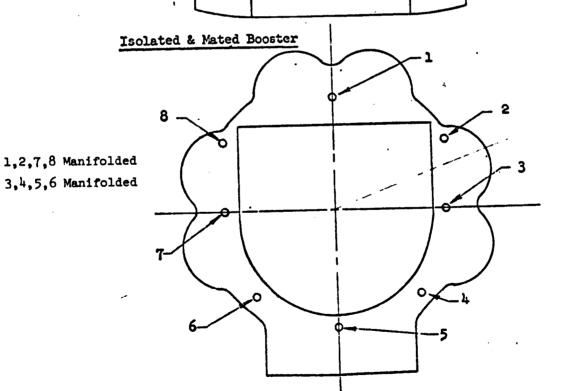


Figure H Base Pressure Taps

DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1130 C-1-368 O PRETEST DATA SET COLLATION SHEET and Control

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Booster, 0.0035-Scale, TEST TEST 440

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Force-Booster + Orbiter, 0.0035- Scale, Launch Stability

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# SSV LAUNCH CURFICURATION

Piggy Back " Baseline (Position 1)

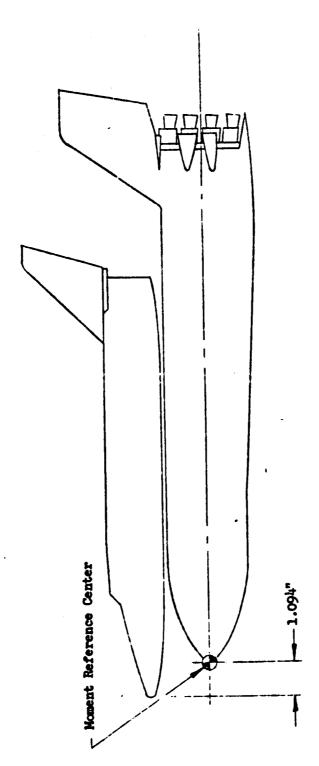


FIGURE 6. BOOSTER ORBITER MOUNTING RELATIONSHIPS

SSV LAUNCH CONFIGURATION

Piggy Back - Nose To Nose (Position 2)

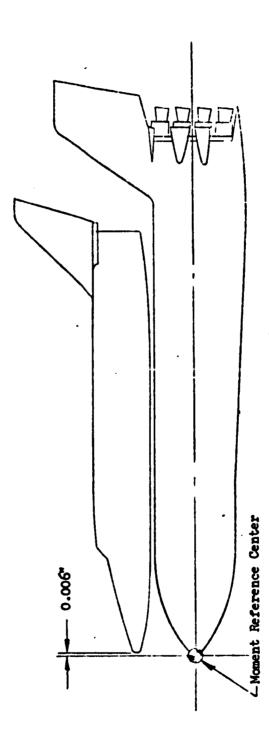


FIGURE 6. BOOSTER ORBITER MOUNTING RELATIONSHIPS (Continued)

DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1130 C-1- 373

# SSV LAURCH CONFIGURATION

Piggy Back - Orbiter Aft (Position 3)

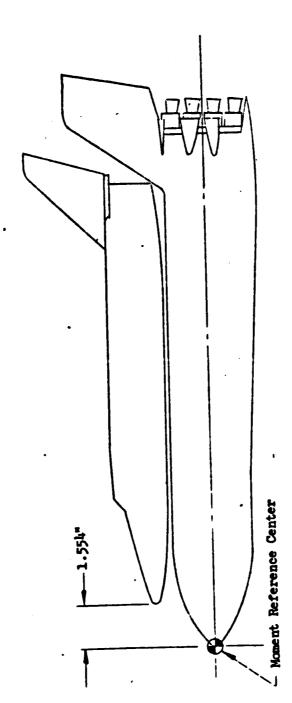
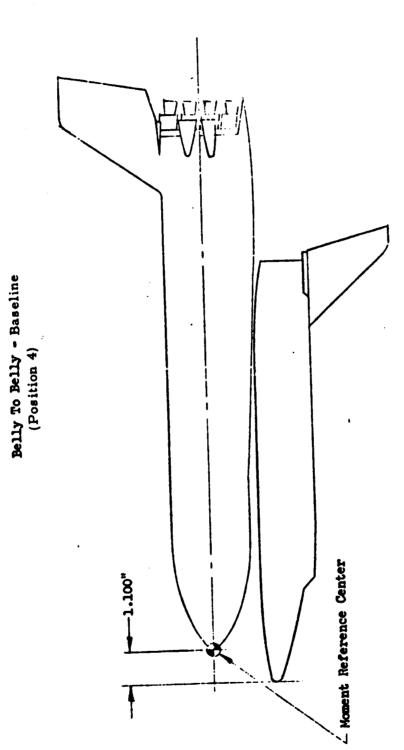


FIGURE 6. BOOSTER ORBITER MOUNTING RELATIONSHIPS (Continued)



SSV LAUNCH CONFIGURATION

FIGURE 6. BOOSTER ORBITER MOUNTING RELATIONSHIPS (Continued)

DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1130 C-1-376

SSV LAUNCH CURFIGURATION

Belly To Belly - Aft (Position 5)

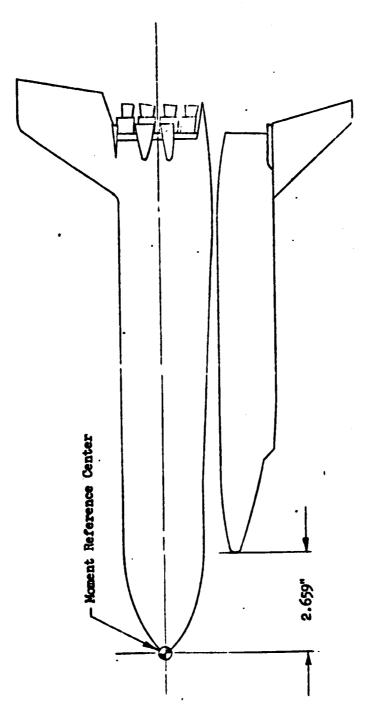
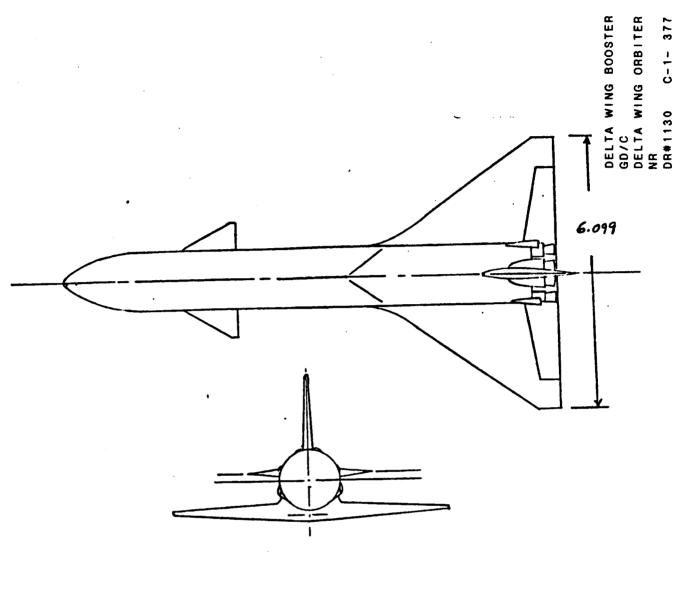


FIGURE 6. BOOSTER ORBITER MOUNTING RELATIONSHIPS (Continued)



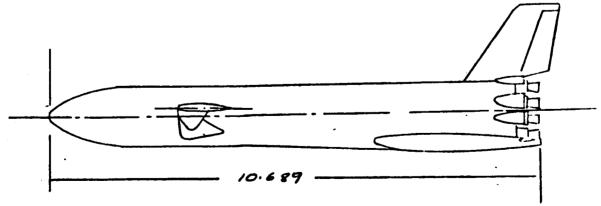


FIGURE 7 THREE-VIEW SKETCH OF BOOSTER BZO WIN CHE VS

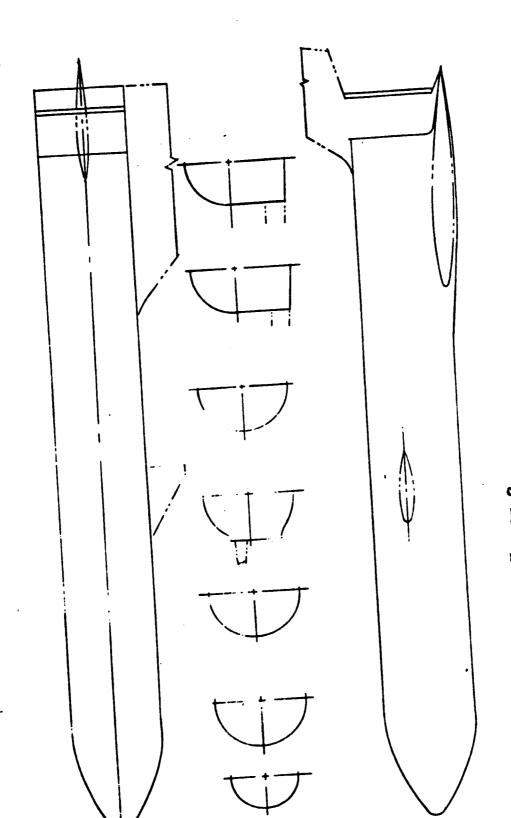


FIGURE 8. Body B20 - Booster B-15 B-1 (Lemchested 104) complayment

### MODEL DESCRIPTION

### Delta Wing Booster - (Cont'd)

DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1130 C-1-379

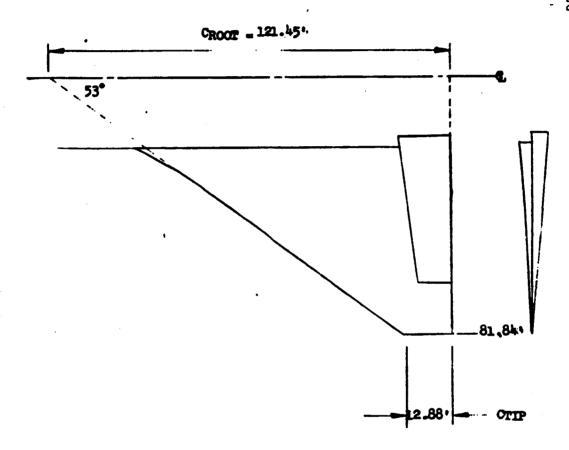


FIGURE 9. WING W14 - BOOSTER CONFIGURATION

Delta Wing Booster - (Cont.q)

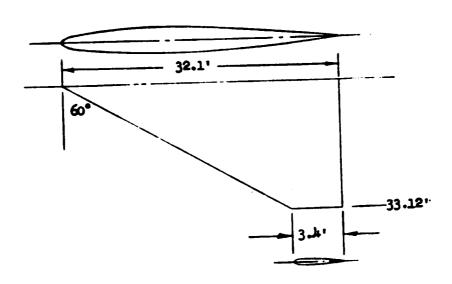


FIGURE 10. CAMARD - CL

## LOS ANGELES DIVISION NORTH AMERICAN ROCKWELL CORPORATION

## MODEL DESCRIPTION

Delta Wing Booster - (Cont'd)

DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1130 C-1-381

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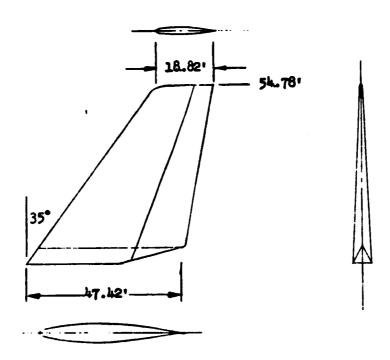
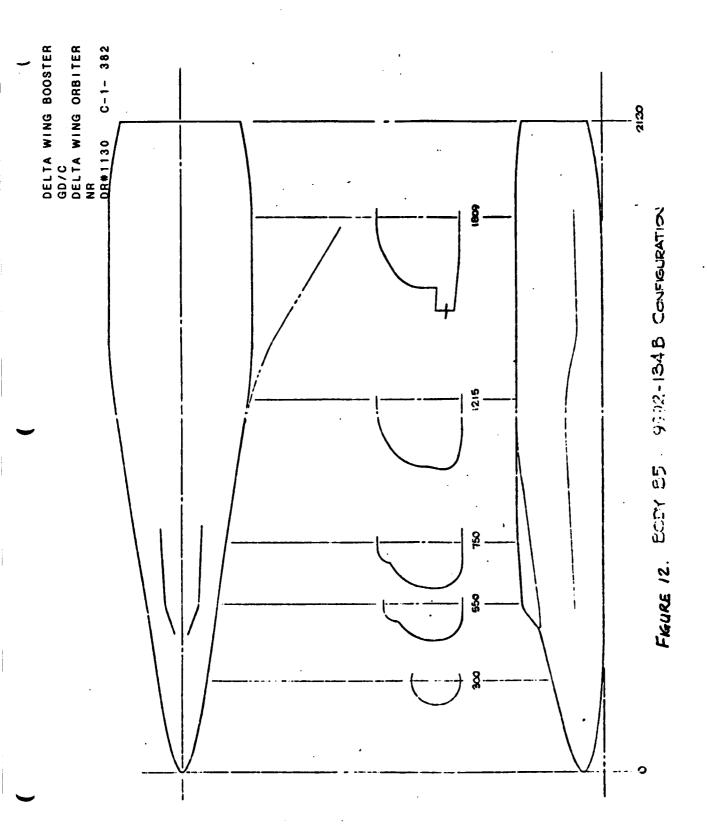
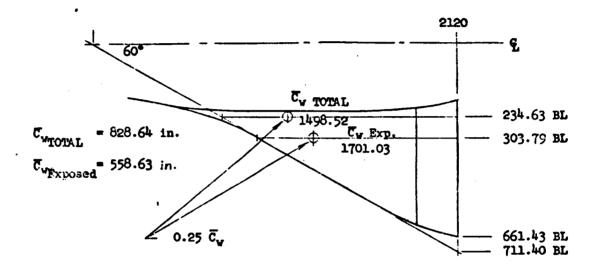


FIGURE 11. VERTICAL TAIL - V8





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5.

TIP CHORD (BL 546.07)
0012-64 SERIES AIRFOIL

FIGURE 13. WING W17 9992-134 D Configuration

LOS ANGELES DIVISION

LOS ANGELES DIVISION

NORTH AMERICAN ROCKWELL CORPORATION

NORTH DESCRIPTION - CONTINUED

Dimensional Data - Continued

Delta Wing Orbiter - Continued

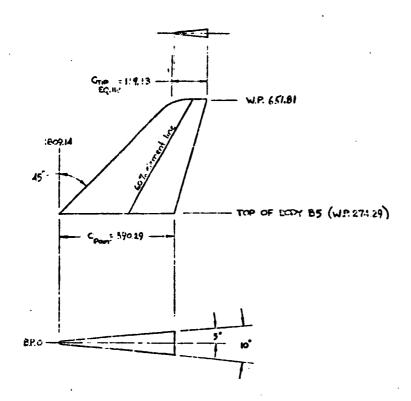
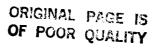
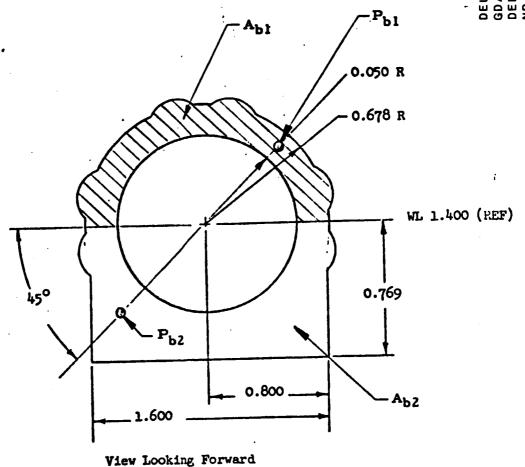


FIGURE 14. VERTICAL STABILIZER VI7



DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1130 C-1-385



NOTE: Location of pressure taps may vary slightly as installation will be made during test setup.

FIGURE 15. BOOSTER BASE PRESSURE ORIFICE LOCATIONS
479

M.1 ....

TABLE IV.

TEST UPUT 966 DATA SET/RUN NUMBER COLLATION SUMMARY

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R445TEK ALGWE	12		7	B						25		35							
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A   5   A   44   50   A   45   A   45   A   45   A   45   A   45   A   A   45   A   A   45   A   A   A   A   A   A   A   A   A	4B BOT		7	0			H			38	42	$\vdash$							
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CRB T FG AL bwe     A 5     A 5     S 5     S 5     S 5       1     13     13     25     31     37     43     49     55       1     13     13     25     31     43     49     55       FW     CH     CLM     CBL     CW     CY     CL     CD     CMB       IENTS:     A) - 8*-> 12*     Ado 24*							-										_		
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7 13 19 25 31 37 43 49 55  CN CA CA CBL CYN CY CL CD CAB IENTS:  A) -8 12 44-2*						-	$\vdash$											, .	
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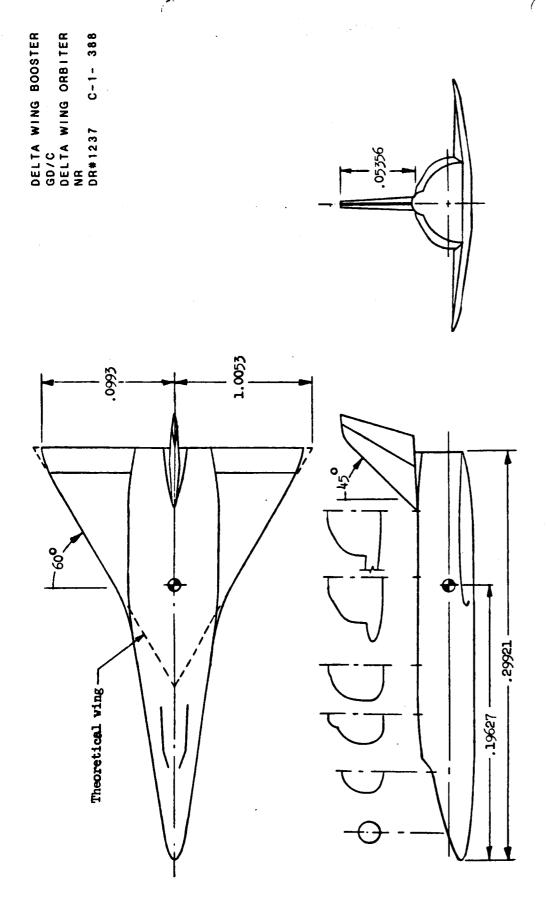
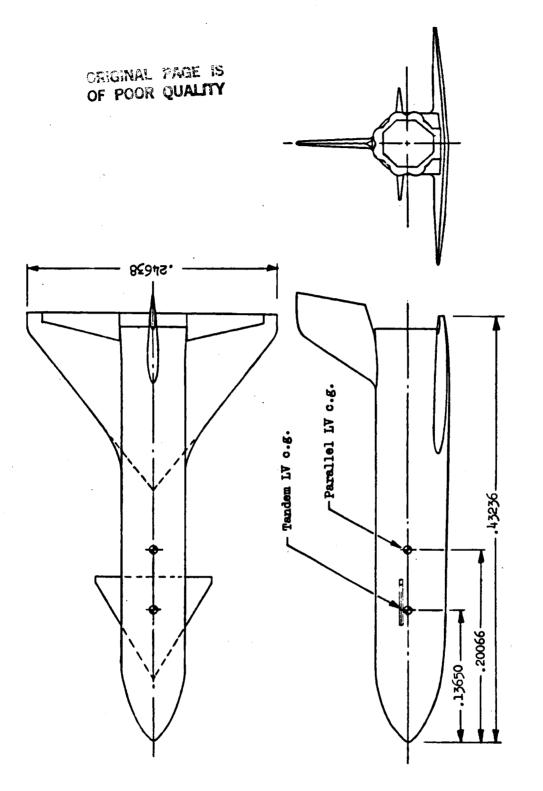


Figure 2. - North American Rockwell 154 D Orbiter All dimensions are in meters.

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Pigure 3.- General Lynamics B9U booster. All dimensions are given in meters.

DELTA WING BOOSTER

DELTA WING ORBITER

NR

DR#1237 C-1-389

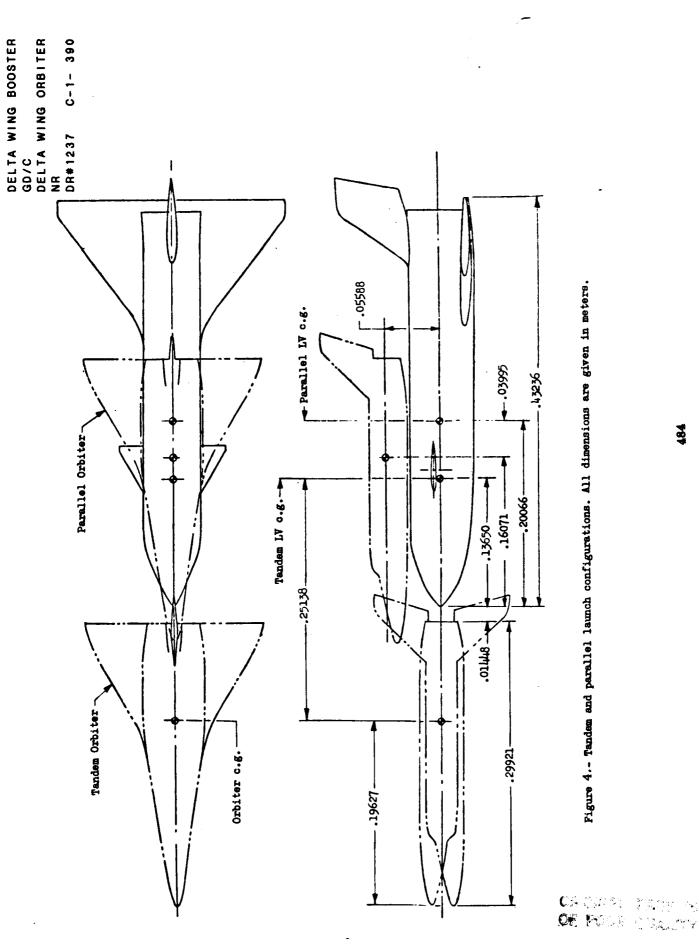


Figure 4.- Tandem and parallel launch configurations. All dimensions are given in meters.

COEFFICIENTS: -

a or B SCHEDULES

MMC DELTA WING ORBITER MSC DR#1213 C-1-391

DELTA WING BOOSTER

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TABLE II

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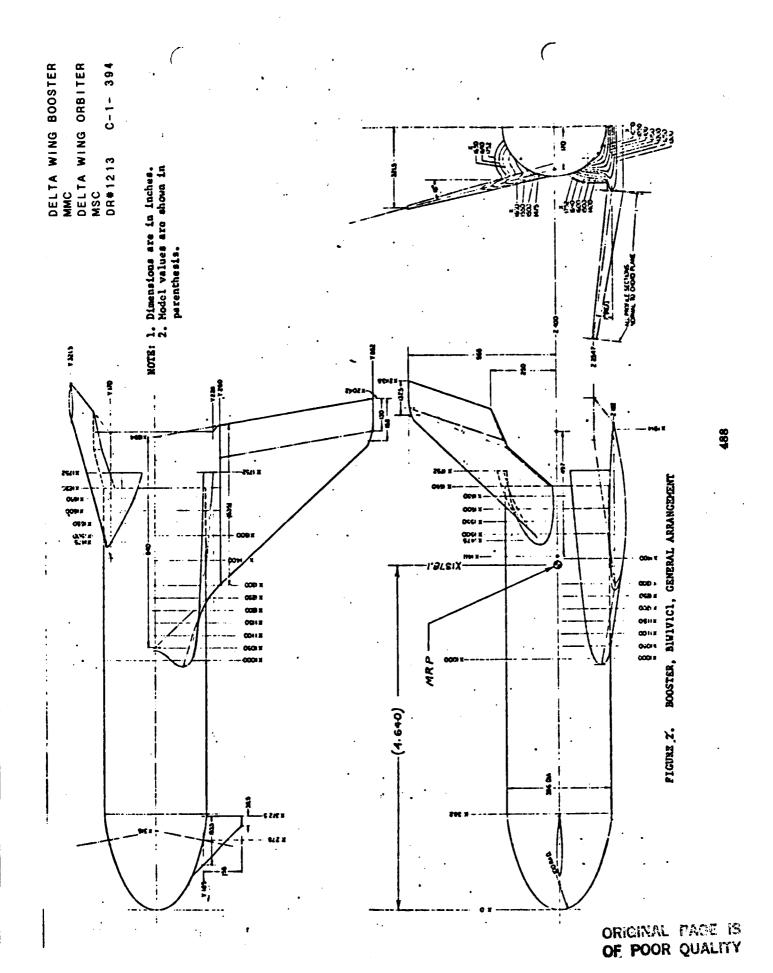
TABLE II (Concluded)

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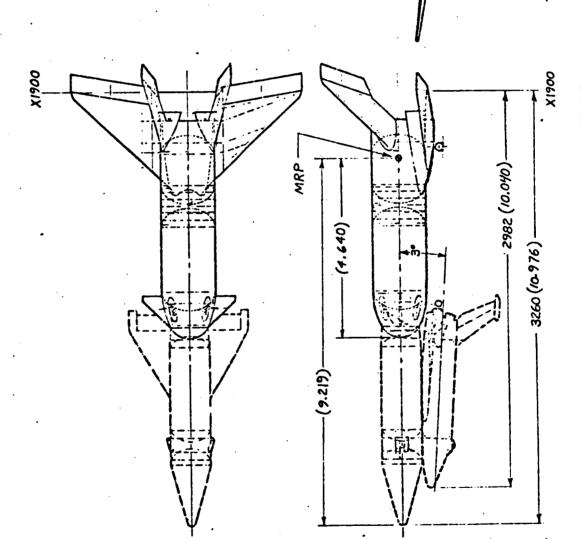
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DR#1213 C-1-393



NOTE: 1. Dimensions are in inches 2. Model values are shown in

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PIGURE 3. LAUNCH CONFIGURATION, L1 01 D1, GENERAL ARRANGEMENT

DELTA WING ORBITER MSC DR#1213 C-1- 395

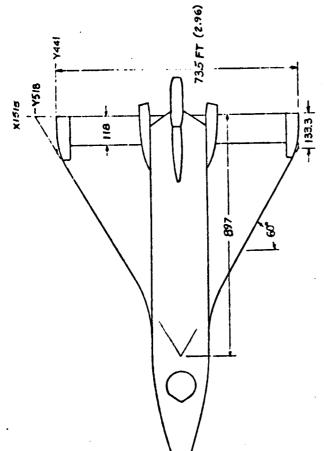
DELTA WING BOOSTER

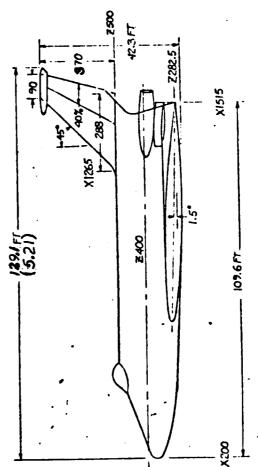
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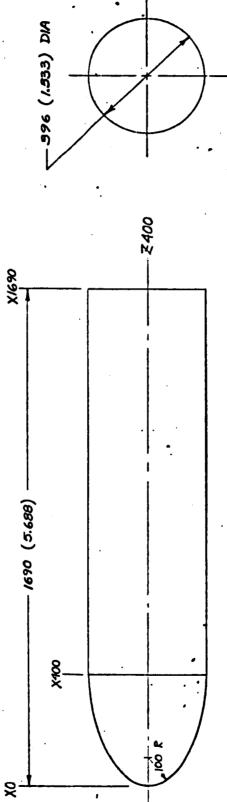
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PIGURE 4. GENERAL ARRANGEMENT OF 040A ORBITER

NOTES:
1. All dimensions are in inches
2. Model values are shown in parenthesis



DELTA WING BOOSTER MMC DELTA WING ORBITER MSC DR#1213 C-1-397

BOOSTER BODY, B1 FIGURE 5.

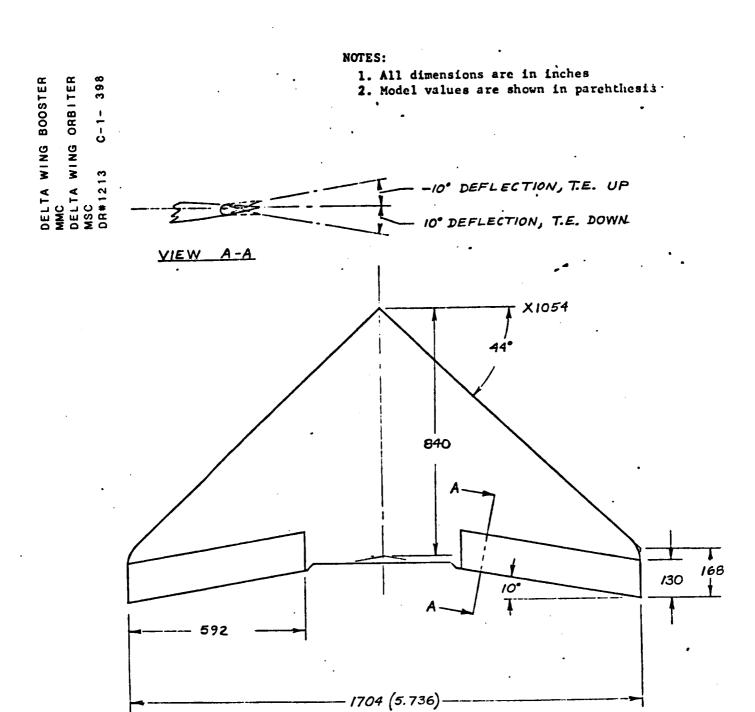
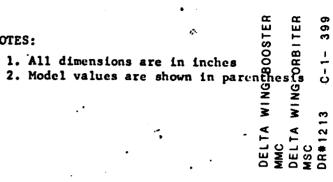
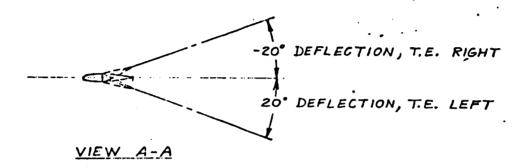


FIGURE 6. BOOSTER WING AND ELEVON, W1

## NOTES:





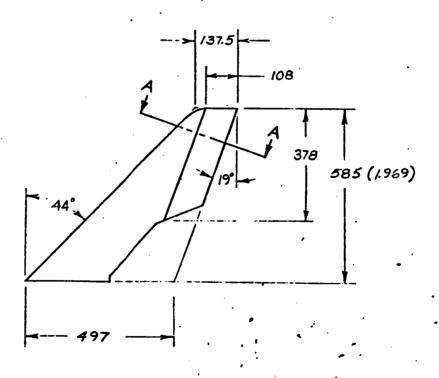


FIGURE 7. BOOSTER VERTICAL TAIL AND RUDDER, V1

1. All dimensions are in inches

2. Model values are shown in parenthesis

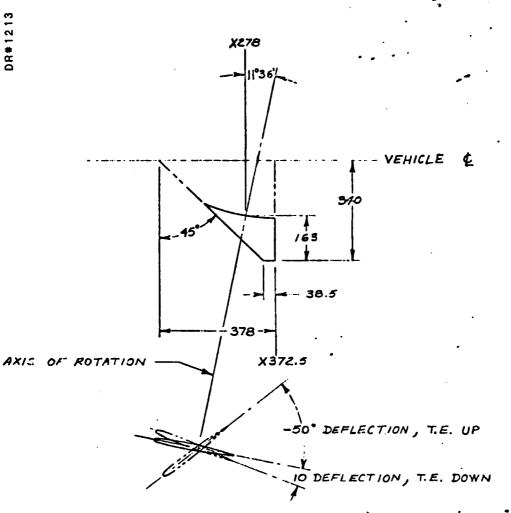


FIGURE 8. BOOSTER CANARD, C1 (LEFT SURFACE SHOWN)

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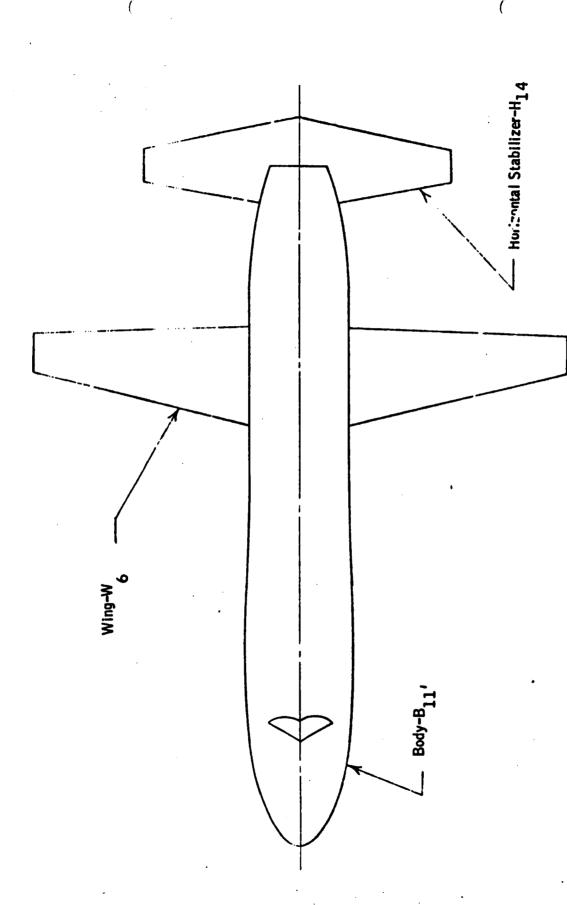
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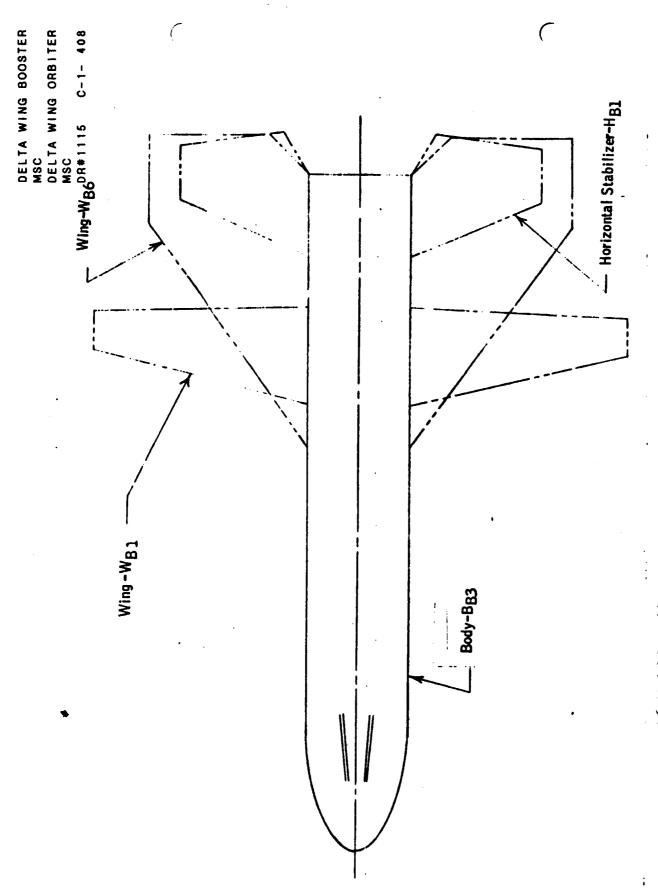
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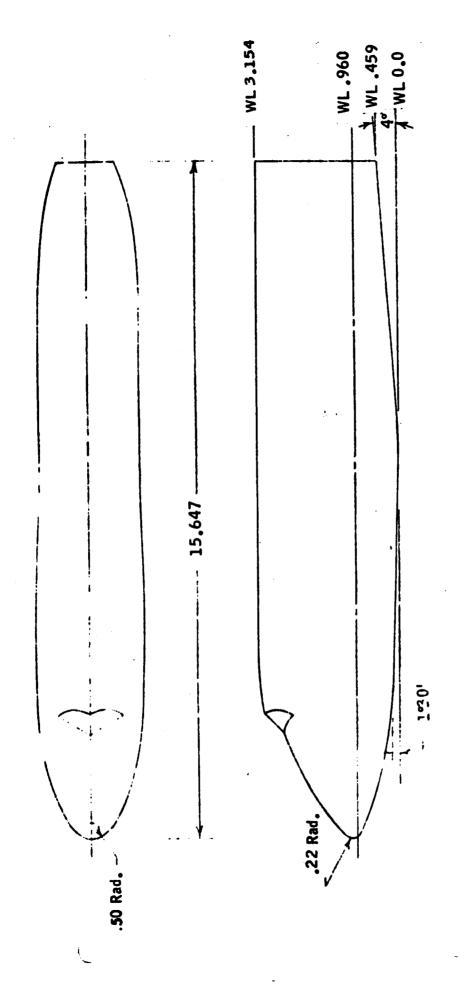


(a) Model Assembly
Figure 5 - 245 Orbiter Configuration. Model S-13A.
All Dimensions are in Inches.

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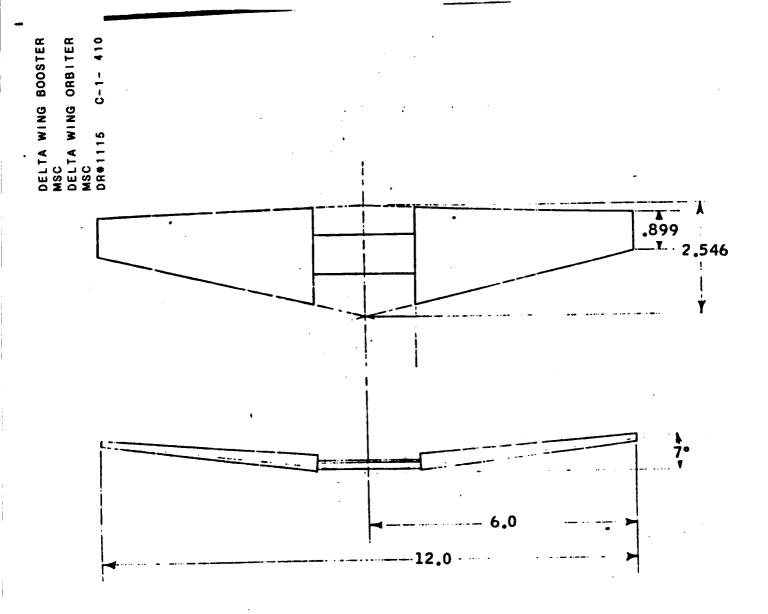


(a) Model Assembly Figure 6 - 251 Booster Configuration. Model SB-13A. All  $\tilde{D}$  imensions are in Inches.



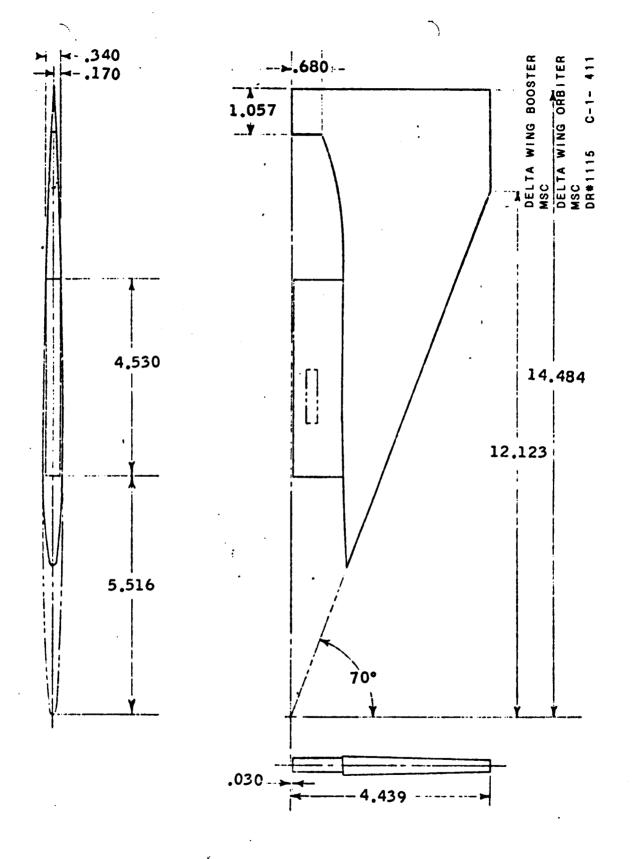
(b) Body - B<sub>11</sub> Figure 5. - Continued.

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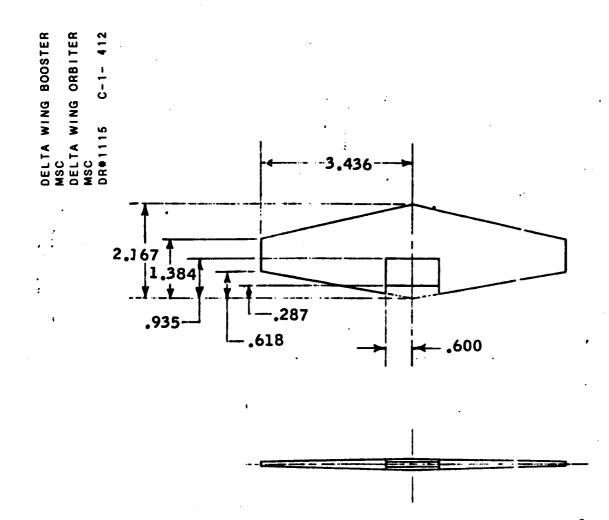
(c) Wing - W<sub>6</sub>

Figure 5 - Continued.



(A) Wing - W<sub>11</sub>

Figure 5 - Continued.



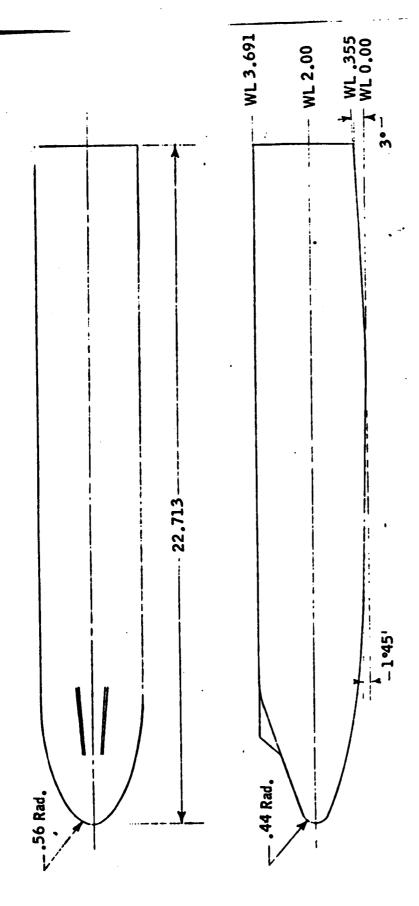
(e) Horizontal stabilizer - H<sub>14</sub>

Figure 5 - Continued.

(e) Vertical tail -  $V_5$ 

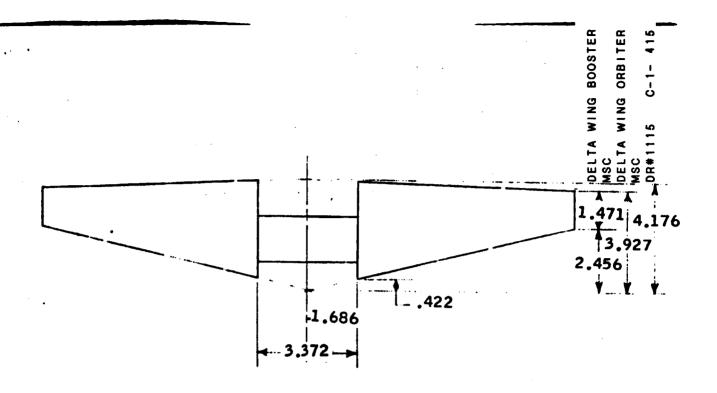
Figure 5 - Concluded.

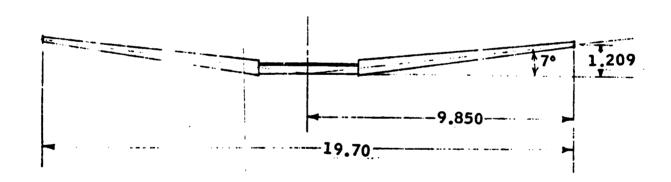
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(b) Body - B<sub>B3</sub>

Figure 6. - Continued.





(c) Wing + WB1

Figure 6 - Continued.

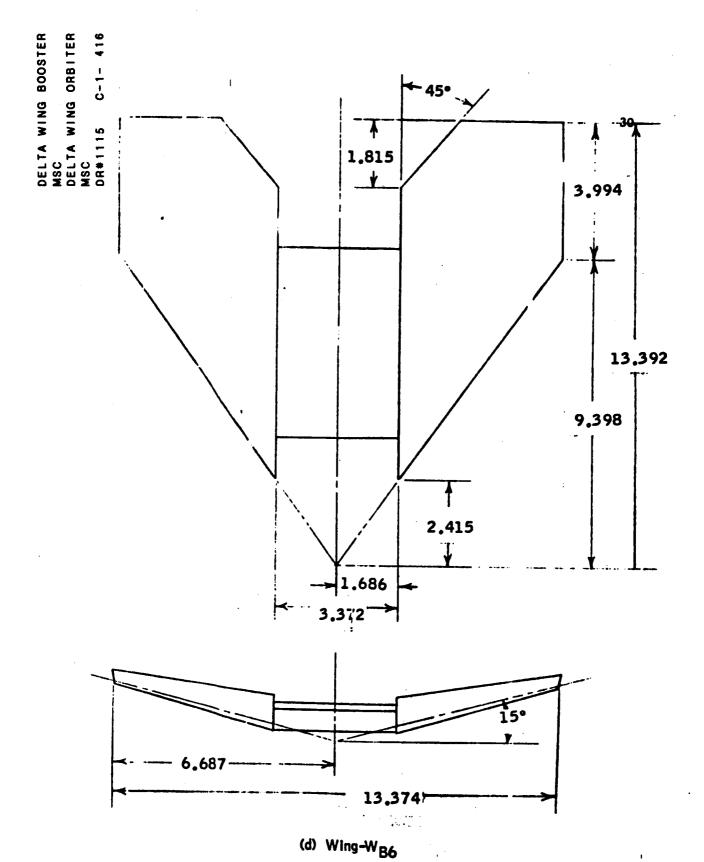
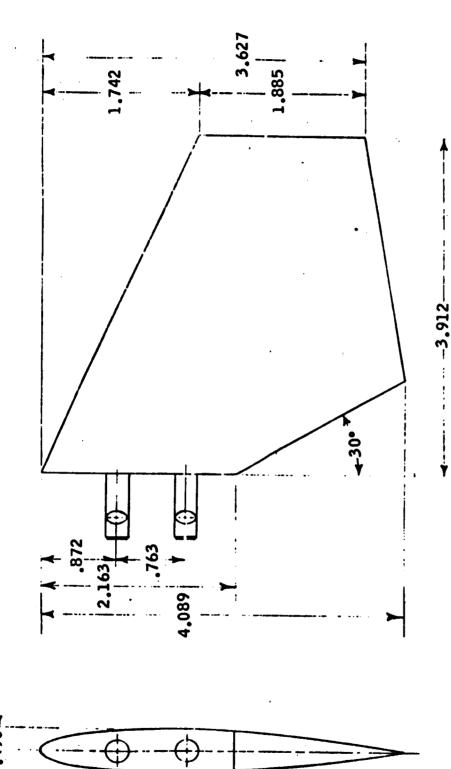


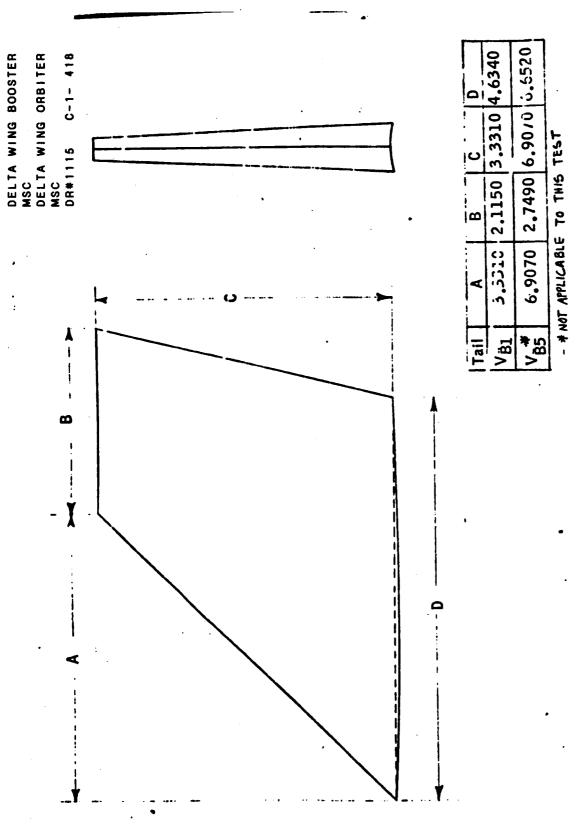
Figure 6 - Continued.



• (e) Horizontal stabilizer - H

Figure 6. - Continued.

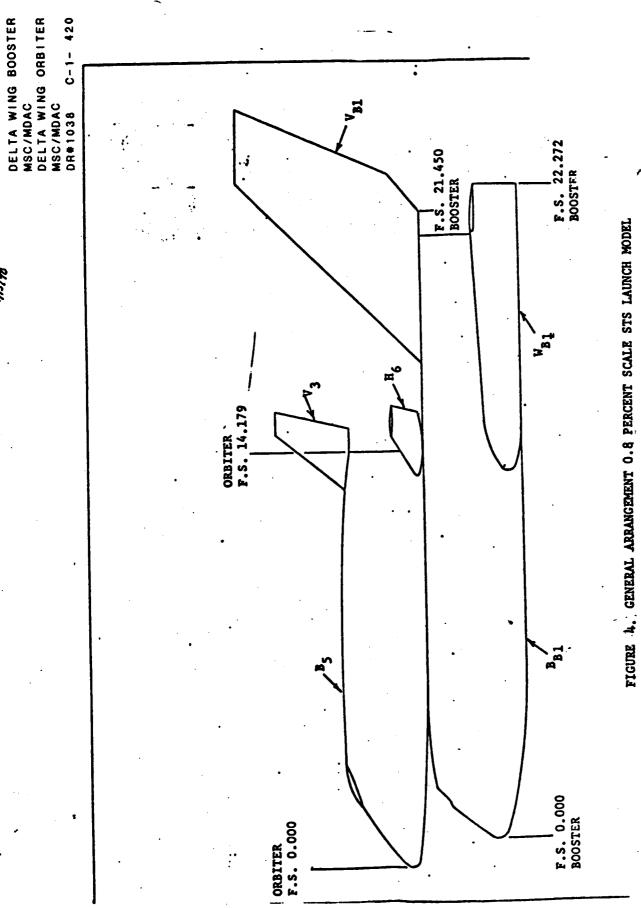
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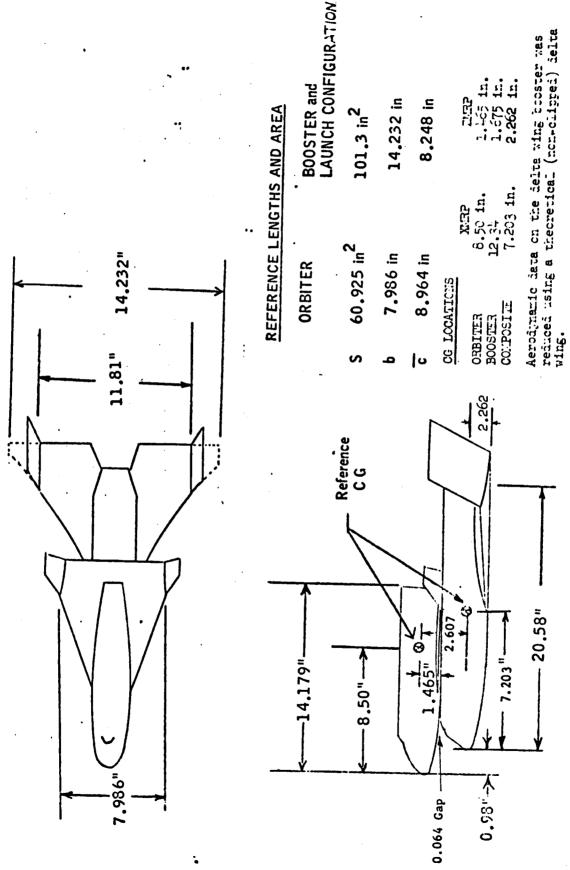
(f) Vertical tail - V V B1 B5

Figure 6. - Continued. -

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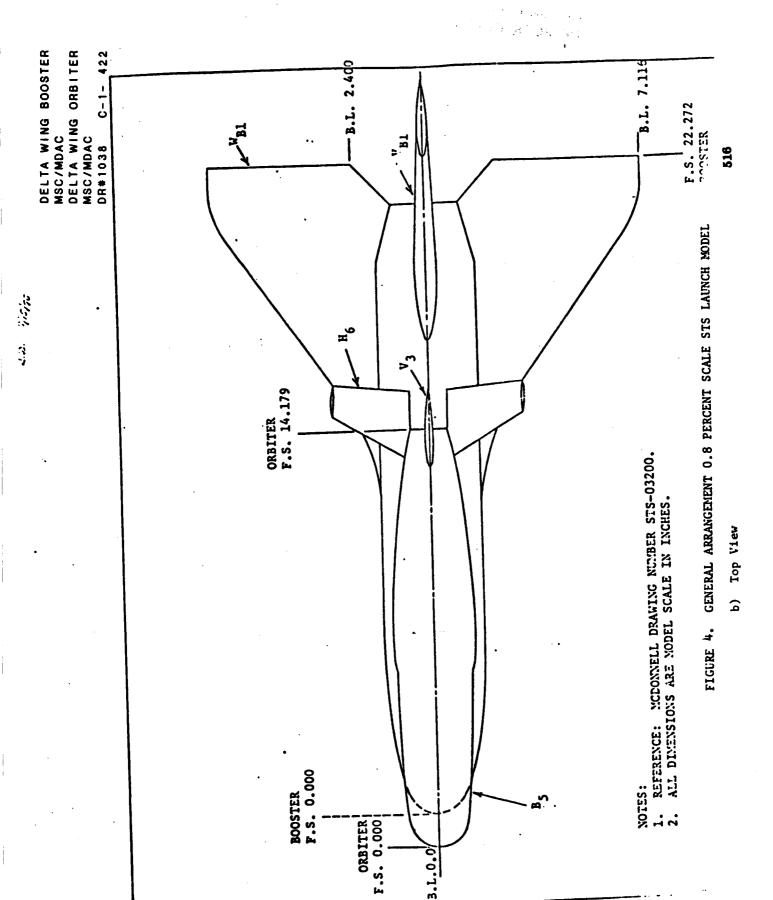
a) Side View

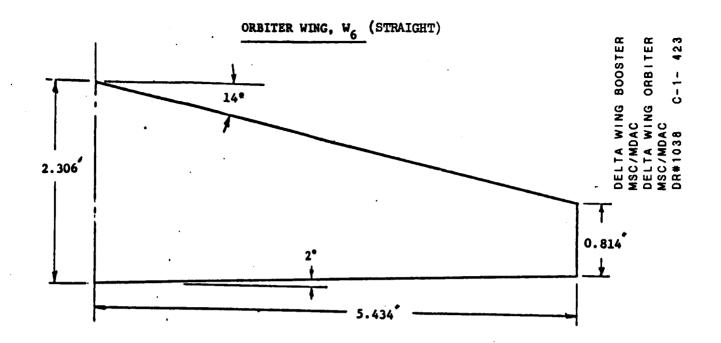


a) Delta Wing Orbiter Niated to the Delta Wing Booster

DELTA WING BOOSTER
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DELTA WING ORBITER
MSC/MDAC
DR#1038 C-1- 421

Figure 6. - Delta Wing Booster Launch Configuration





## ORBITER VERTICAL TAIL, V

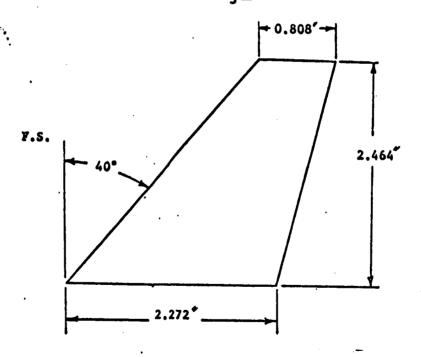
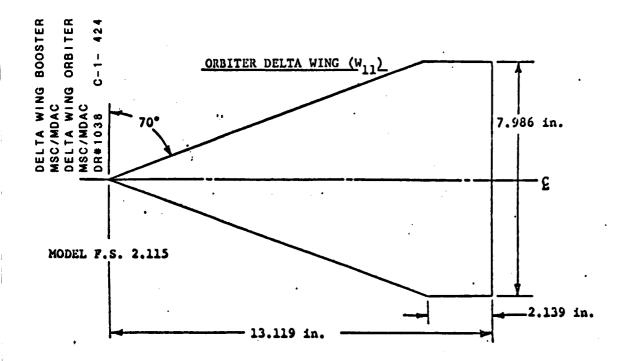


Figure 7.



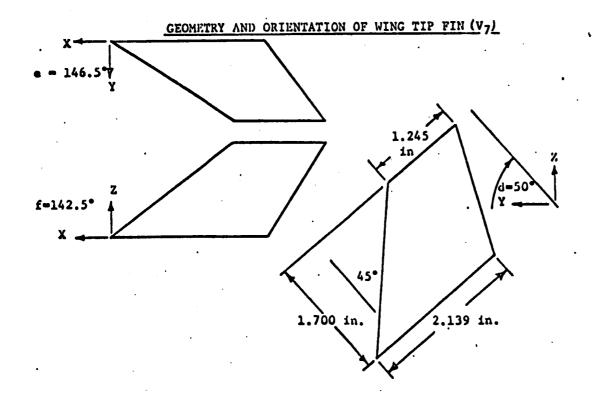
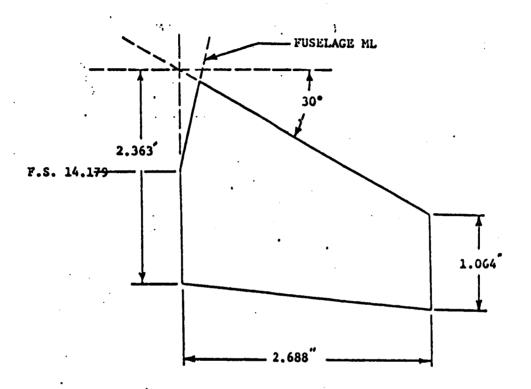


Figure 8.

## ORBITER HORIZONTAL TAIL, H<sub>13</sub>



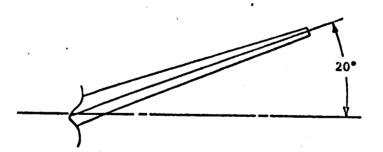
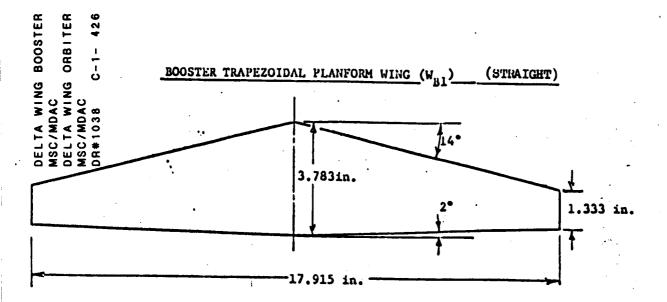


Figure 9



## BOOSTER HORIZONTAL TAIL (HR1)

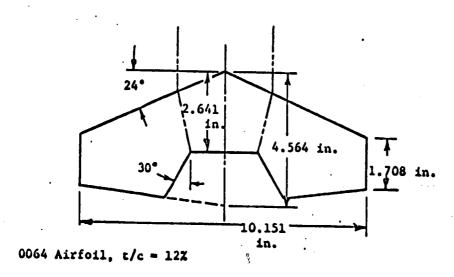
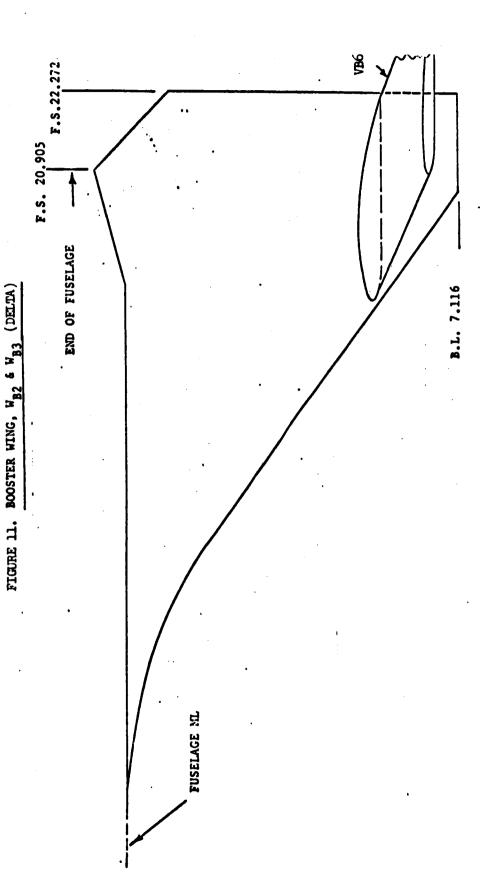


Figure 10.



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MSC/MDAC
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## BOOSTER VERTICAL TAIL, VB5

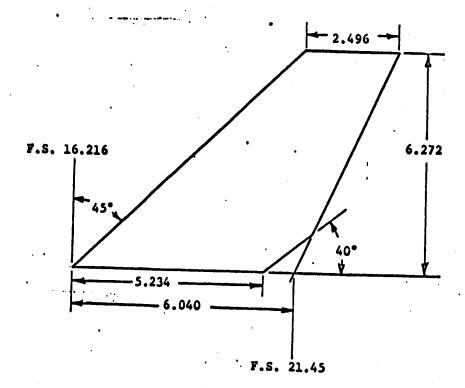
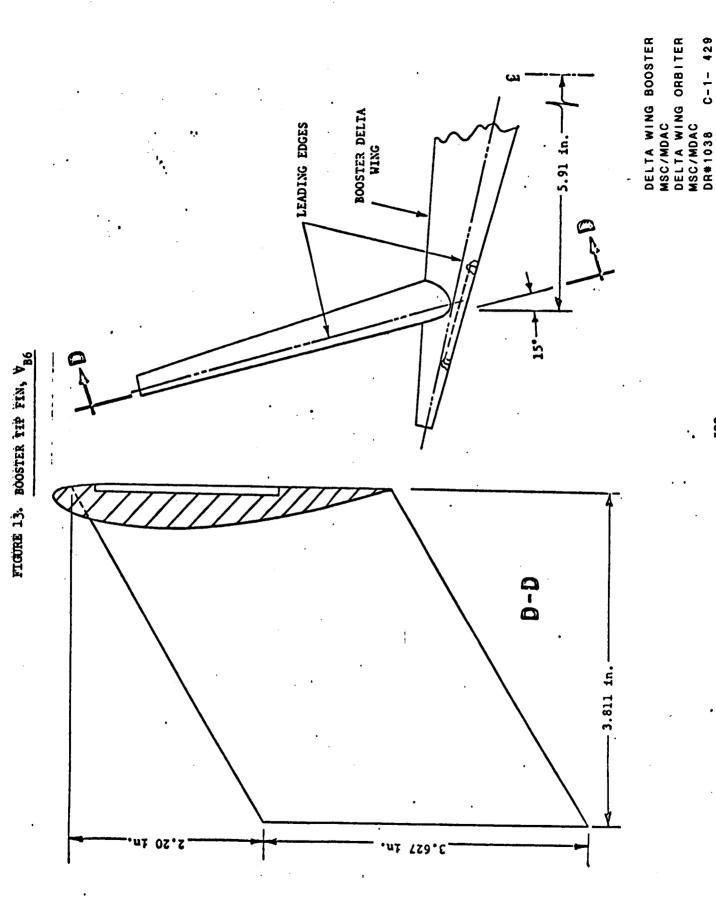


Figure 12.



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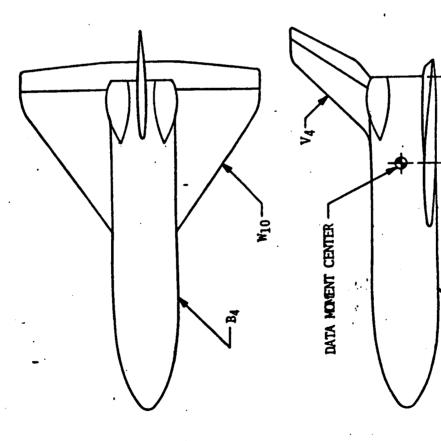
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S = 13.0528 sq. in. (9000 sq. ft.)  $t_{LONG} = 4.515$  in. (112 ft)  $t_{LAT} = 4.908$  (121.5 ft)  $A_{B} = 1.5580$  (Nom.) (955 x

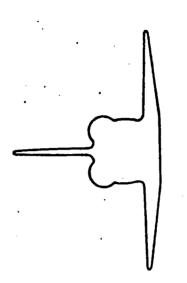
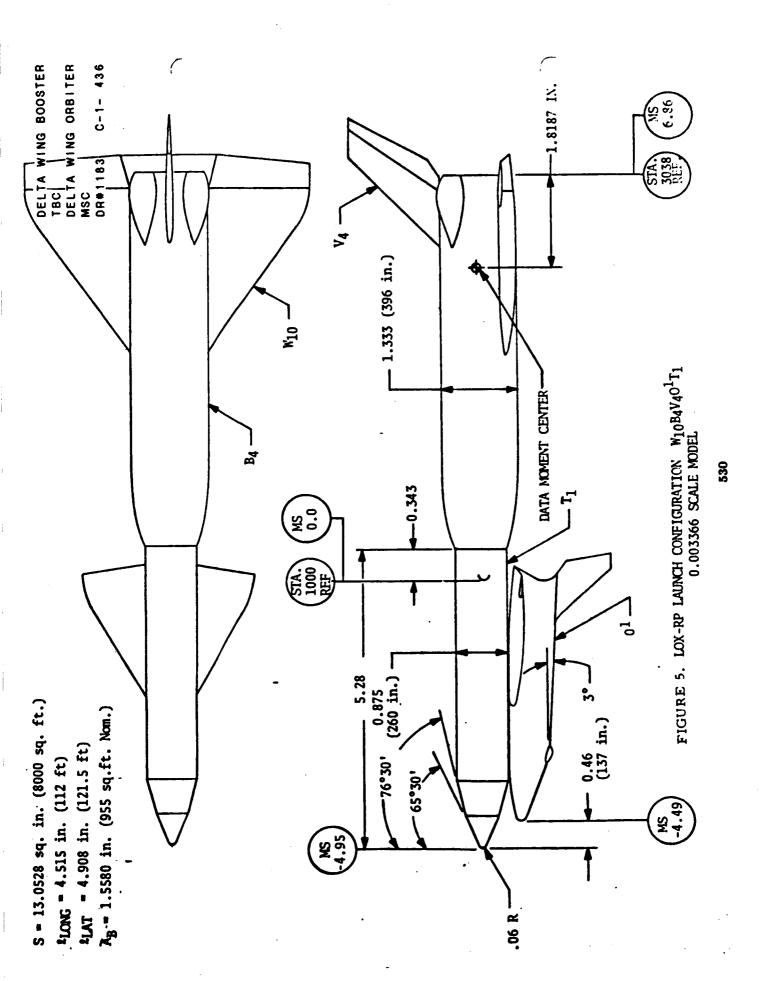


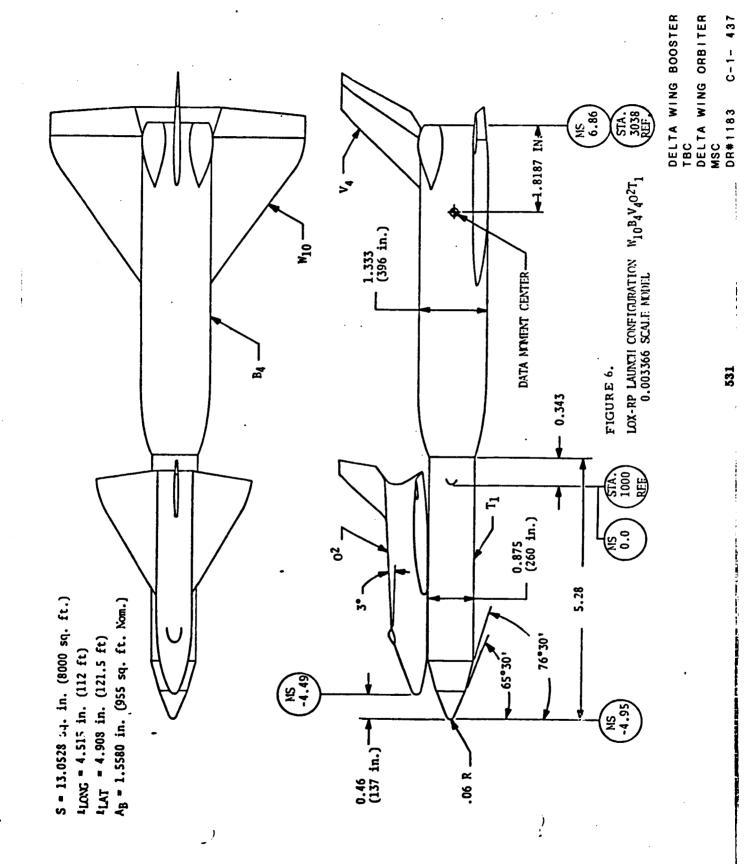
FIGURE 4. 0.003366 SCALE AR12161-1 BOOSTER

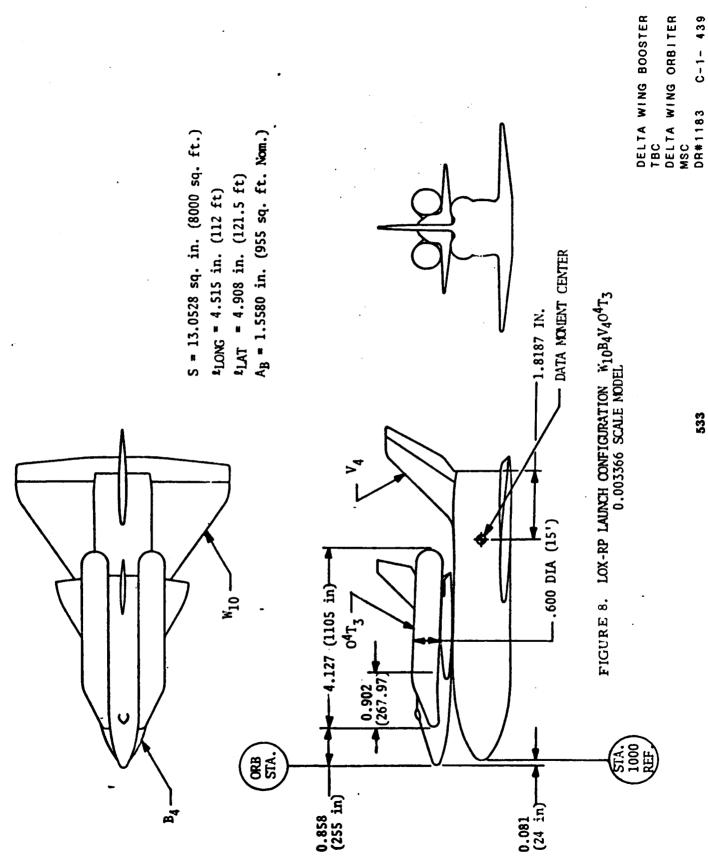
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DELTA WING BOOSTER
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DELTA WING ORBITER
MSC
DR#1183 C-1- 435







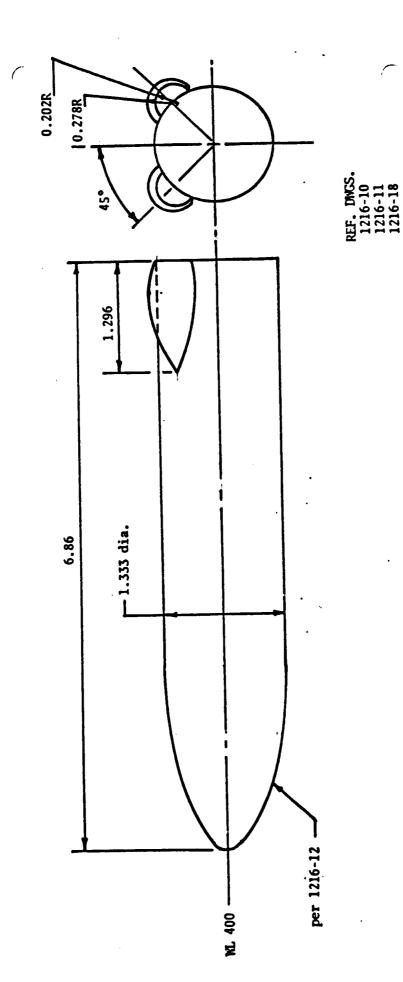
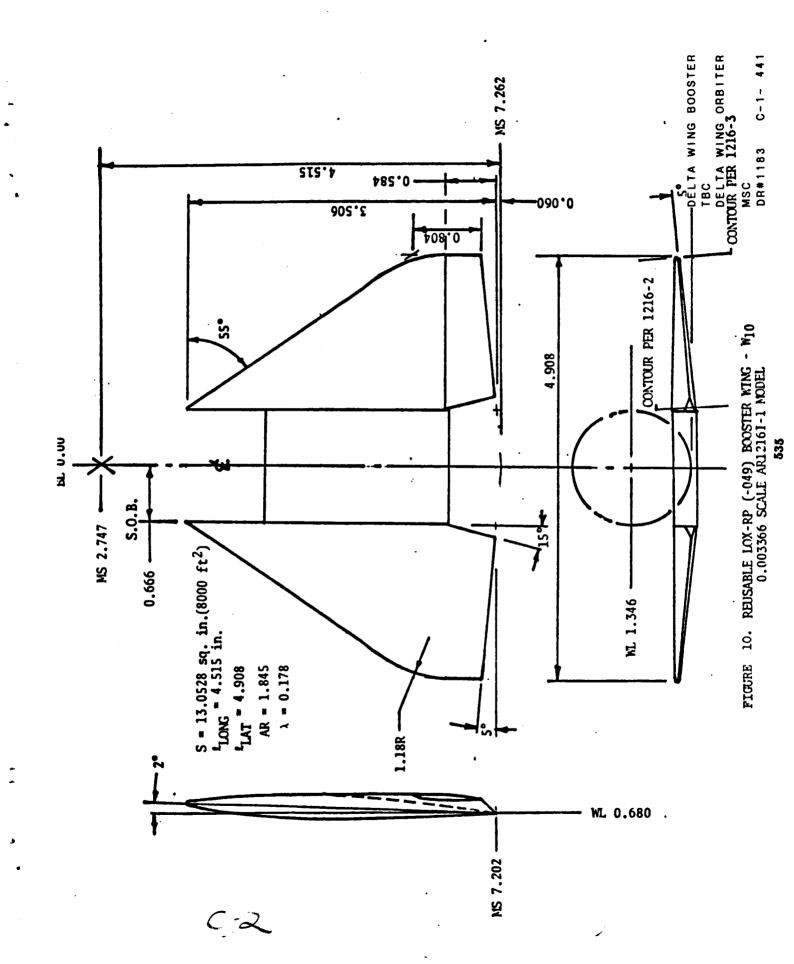
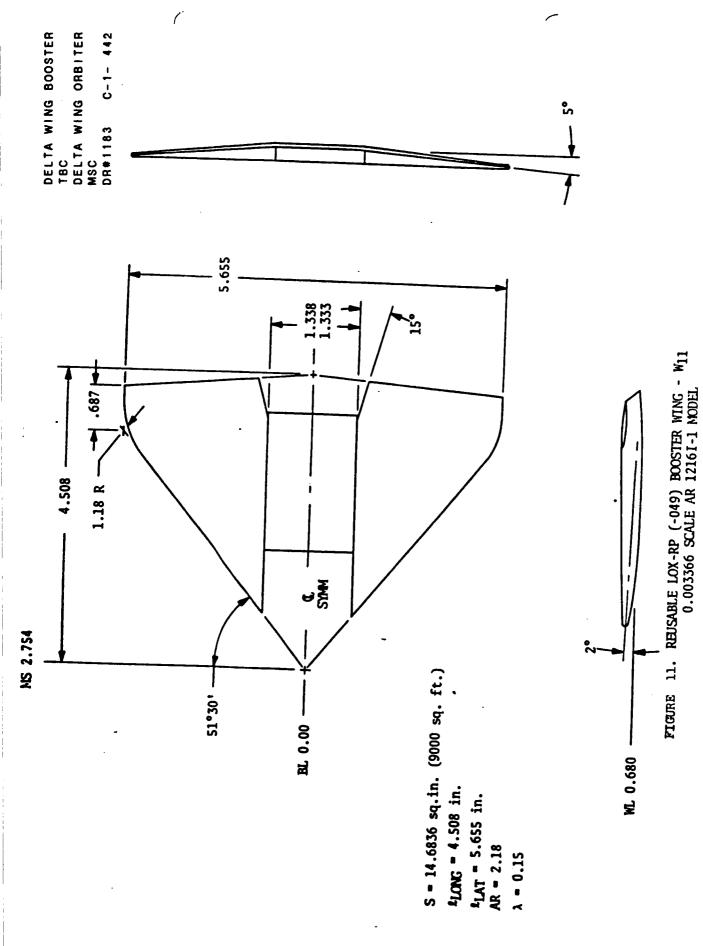


FIGURE 9. REUSABLE LOX-RP (-049) BOOSTER BODY - B4 0.005366 SCALE AR1216I-1 NODEL





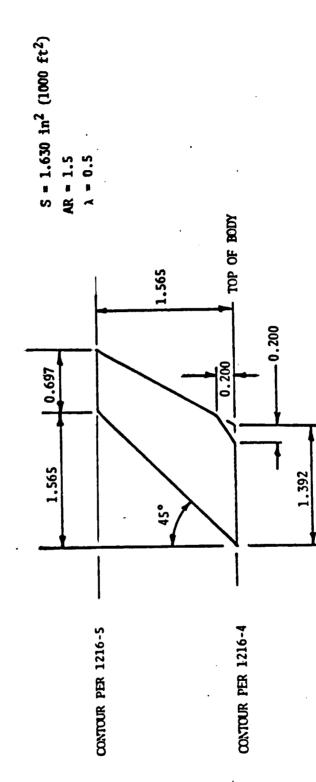
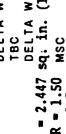
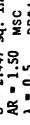
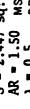


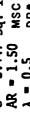
FIGURE 12. REUSABLE LCN-RP (-049) BOOSTER VERTICAL TAIL - V<sub>4</sub> 0.003366 SCALE AR1216I-1 NODEL

DELTA WING BOOSTER TBC DELTA WING ORBITER MSC DR#1183 C-1- 443















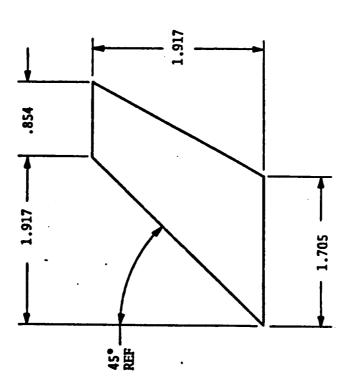
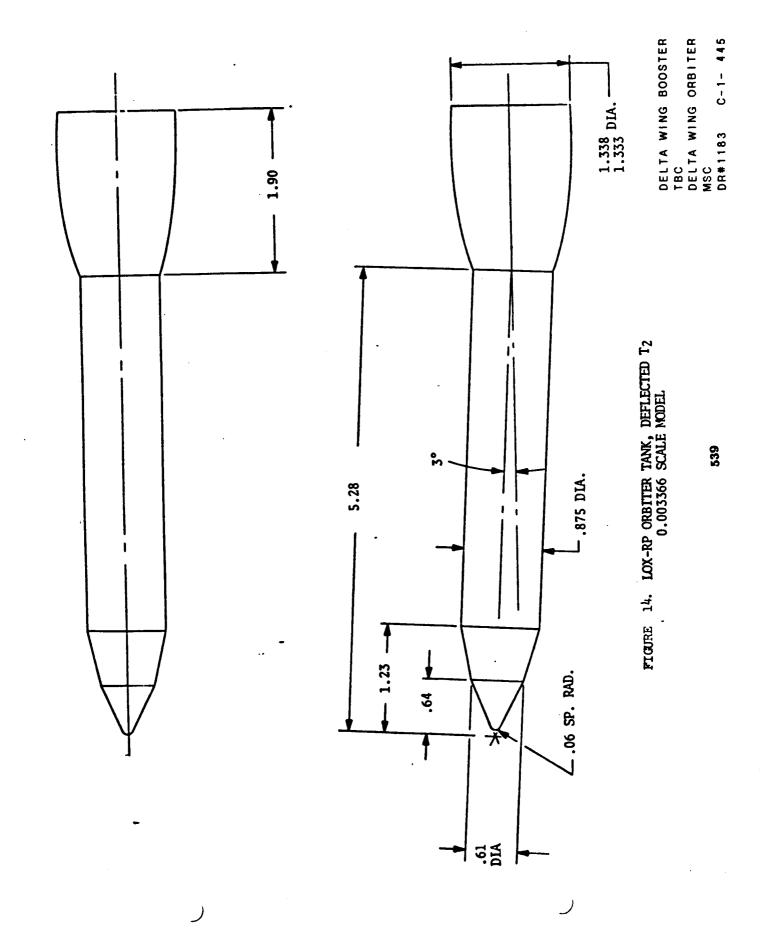
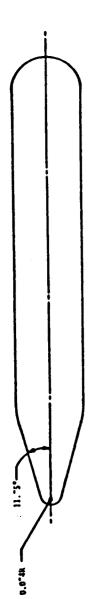


FIGURE 13. REUSABLE LOX-RP (-049) ROOSTER VERTICAL TAIL - VS 0.003366 SCALE AR 12161-1 MODEL





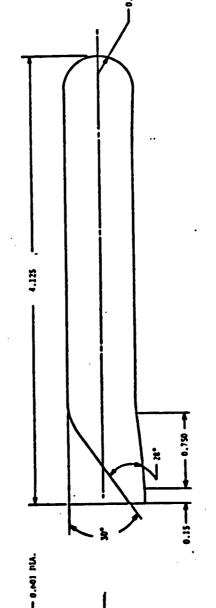
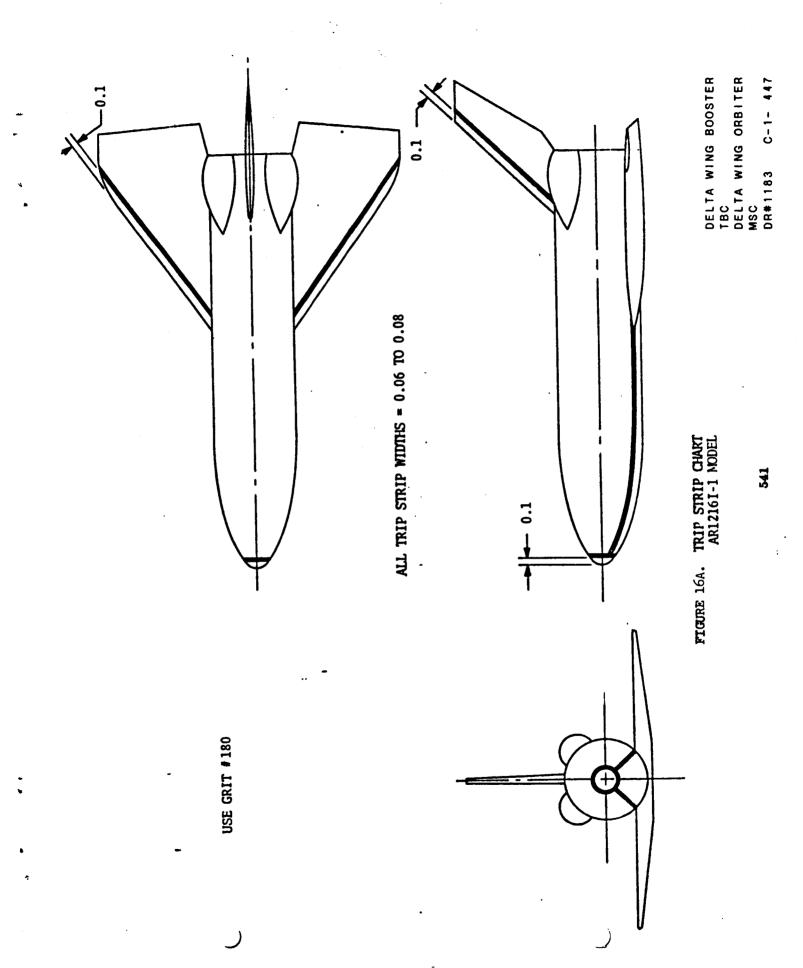
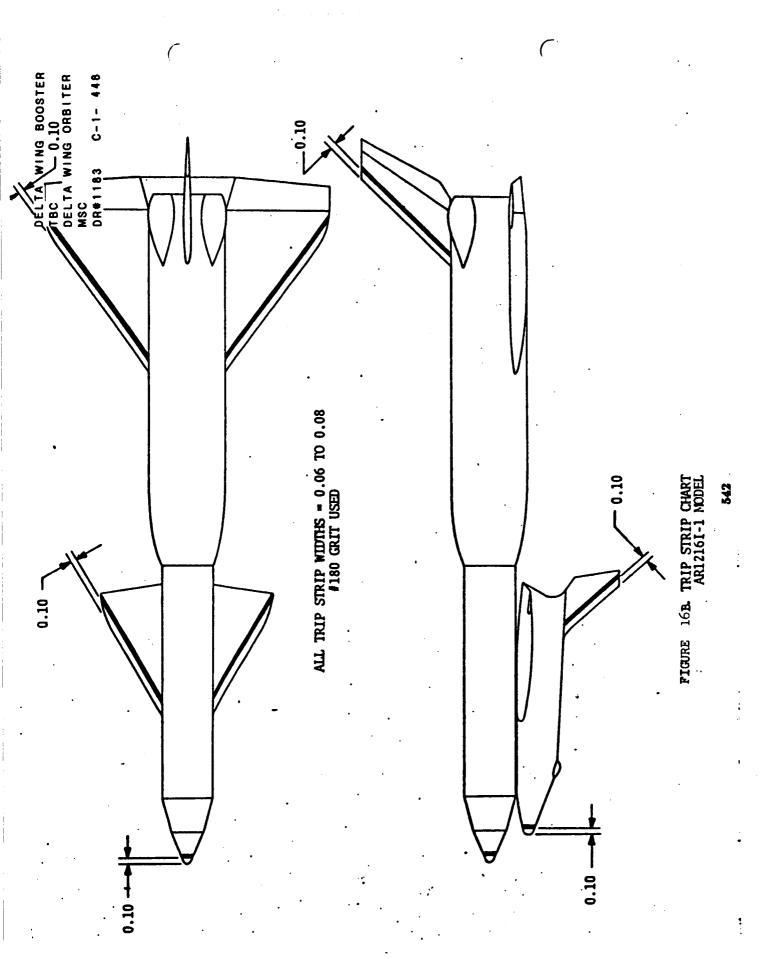
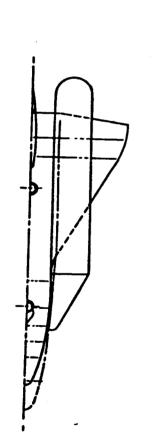


FIGURE 15. ORBITTER DROP TANKS - T3 0.003366 SCALE NODEL AR 12161-1







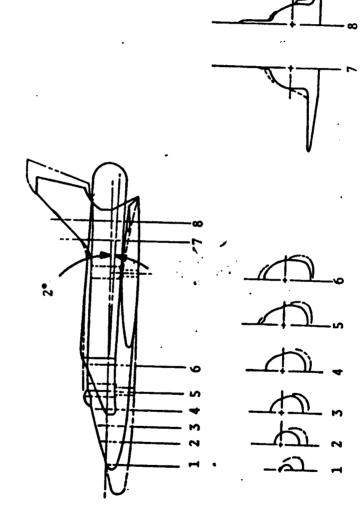


FIGURE 18. MSC-040M ORBITER 0.003366 Scale Model

DELTA WING BOOSTER MDAC STRAIGHT WING ORBITER MSC DR#1047 C-1- 450

TEST CFHT No. 54 DATA SET - ORGANIZATION - SHEET

MACH NUMBERS MICHIALPHA -8, -6, -4, -2, 0, 2, 4, 6 10.4 7 CONTROL DEFLECTION NO. CACLM -10, 7 SCHD. d ALPHA Schedule: A Q(PSF)CONFIGURATION Z U BIWZV3H6I2G2 BIWZY 3H6L1G1 BIW2V3H6L2G1 BIWZV 3H6L3G1 BLWZV3H6LO CORFFICIENTS: DATA SET IDENTIFIER RLBOOZ RLB006 RLB007 RLB008 RLB009

7

a or B SCHEDULES

SSD-A.

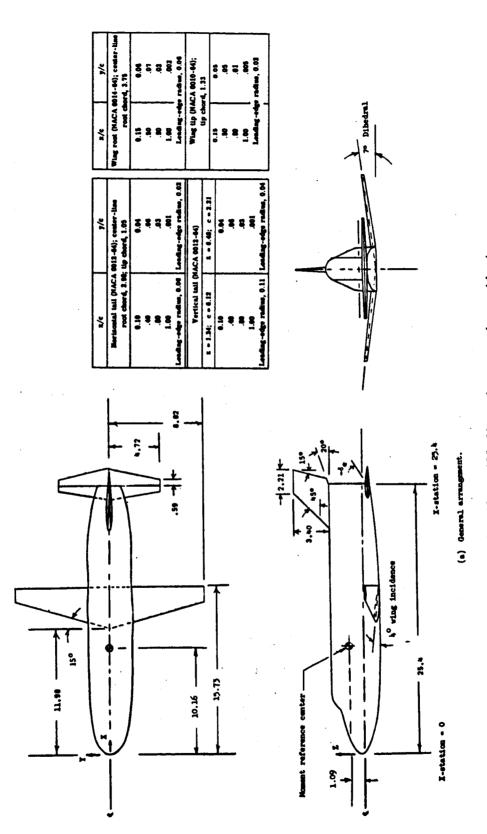
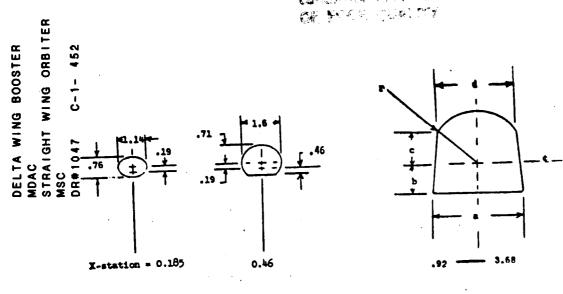
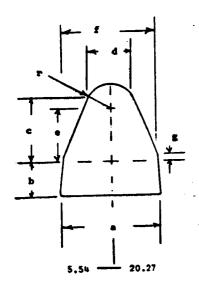
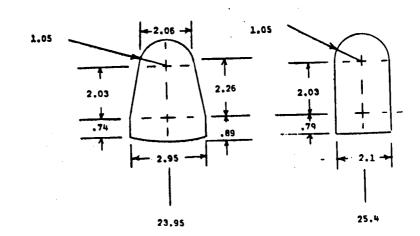


FIGURE 2 Orbiter model details. All dimensions are in centimeters.

DELTA WING BOOSTER
MDAC
STRAIGHT WING ORBITER
MSC
DR#1047 C-1- 451

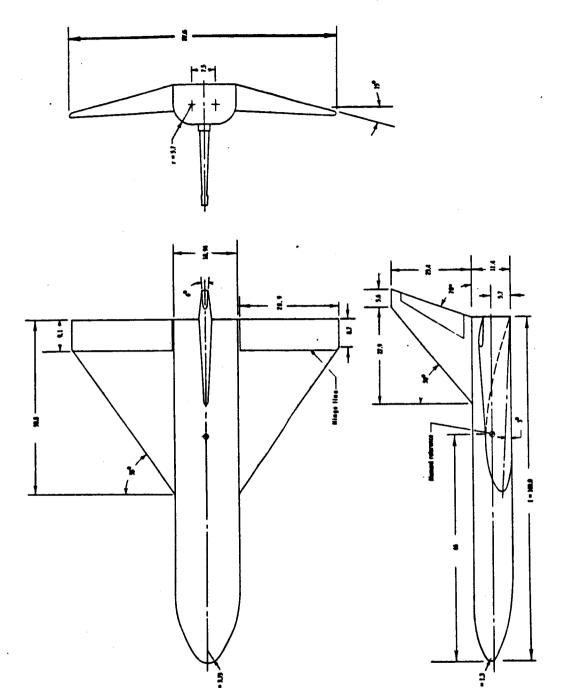






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1.85	2.79	.73	1.02	2.11				1.47
2.76	3.25	.97	1.12	2.62				1.78
3.68	3.56	1.14	1.27	3.05	1	l		2.03
8.54	3.91	1.37	2.41	1.75	2.03	3.68	0.25	.99
7.37	4.06	1.42	2.49	1.91	2.03	3.81	.25	1.05
11.05	4.19	1.52	2.49	1.91	2.03	3.94	.29	1.05
13.82	4.14	1.63	2.49	1.91	2.03	3.94	,29	1.05
15.55	3.94	1.52	2.48	1.91	2.03	3.94	.29	1.05
20.27	3.94	1.21	2.48	1.91	2.03	3.94	.29	1.05

FIGURE 3 Orbiter model cross-sections



1 - 16 Inch 1 40,6 cm. )

DELTA WING BOOSTER
MDAC
STRAIGHT WING ORBITER
MSC
DR#1047 C-1- 453

FIGURE 4 Sweiter medel getalit. Unaar dimenations are in percent of medel tength.

DELTA WING BOOSTER
MDAC
STRAIGHT WING ORBITER
MSC
DR#1047 C-1- 454

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Booster removed

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location

12.7 1 20 € 10. 16 Balance centerline .. Gap setting \_\_

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Wings omitted for clarity

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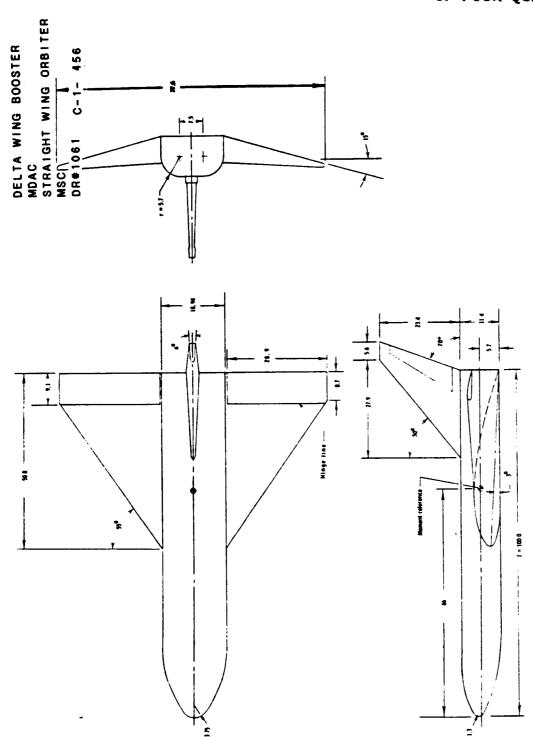
Orbiter shown here in axial location L3

Drawing of orbiter - booster arrangement. All dimensions in centimeters. FIGURE 5

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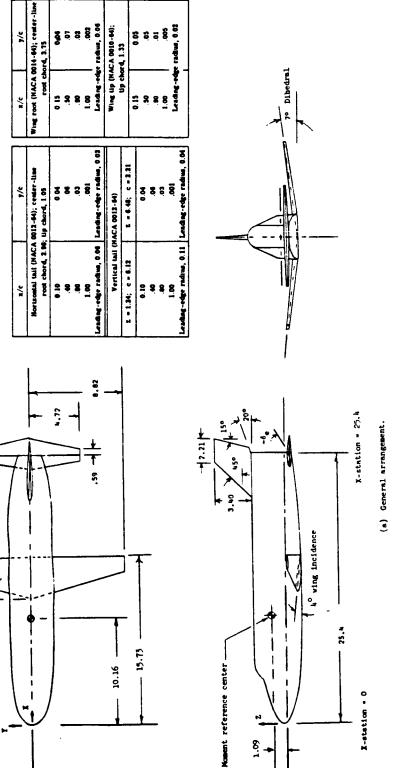
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DATA SET - ORGANIZATION - SHEET



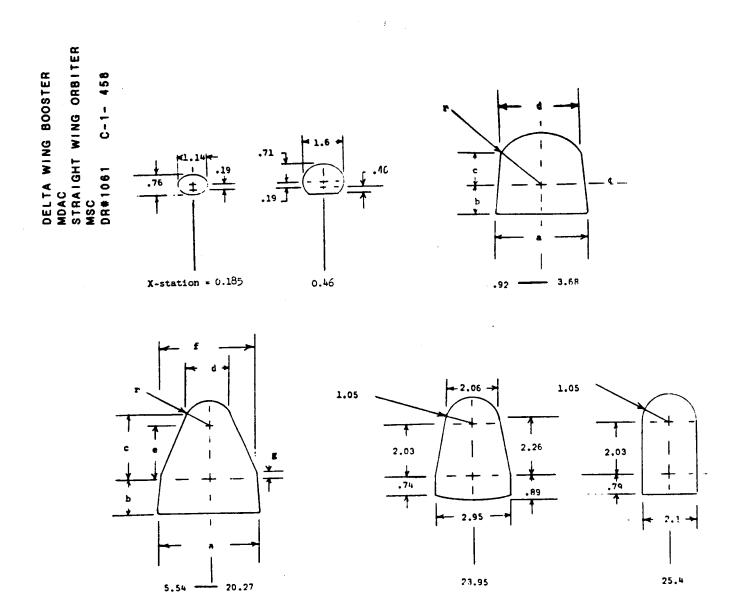
Booster model details. Linear dimensions are in percent of model length.

FIGURE 2.



11.9

Orbiter model details. All dimensions are in centimeters. FIGURE 3.

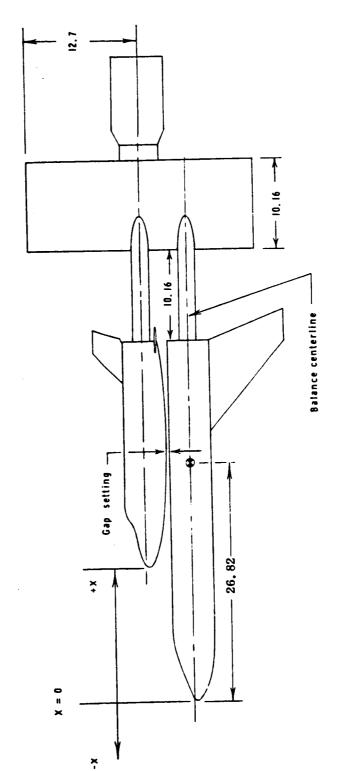


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5.54	3.91	1.37	2.41	1.75	2.03	3.68	0.25	.99
7.37	4.06	1.42	2.49	1.91	2.03	3.81	.25	1.05
11.05	4.19	1.52	2.49	1.91	2.03	3.94	.29	1.05
13.82	4.14	1.63	2.49	1.91	2.03	3.94	.29	1.05
15.55	3.94	1.52	2.48	1.91	2.03	3.94	.29	1.05
20.27	3.94	1.21	2.48	1.91	2.03	3.94	.29	1.05

FIGURE 4.

(b) Orbiter model cross-sections.

## ORIGINAL PAGE IS OF POOR QUALITY



555 3

Wings omitted for clarity

Orbiter shown here in axial location L3

Ali dimensions in centimeters.
Sketch of booster - orbiter arrangement.
FICURE 5.

4G BOOSTER		WING ORBITER		C-1- 459
DELTA WING	MDAC	STRAIGHT	MSC	DR#1061

DELTA WING BOOSTER
MSC
MSC
DR#1058 C-1-460 OPRETEST

TEST S XXVIII LIME I DAT, WET COLLATION SHEET

POSTTEST

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STRAIGHT WING ORBITER
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DELTA WING BOOSTER MSC Straight Wing Orbiter MSC

C-1- 464

DR#1058

PPOSTTEST

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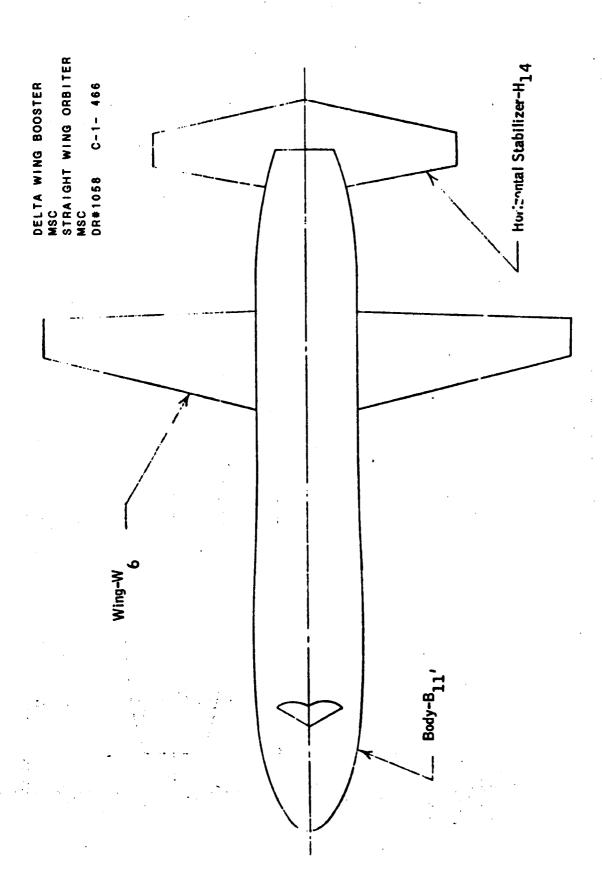
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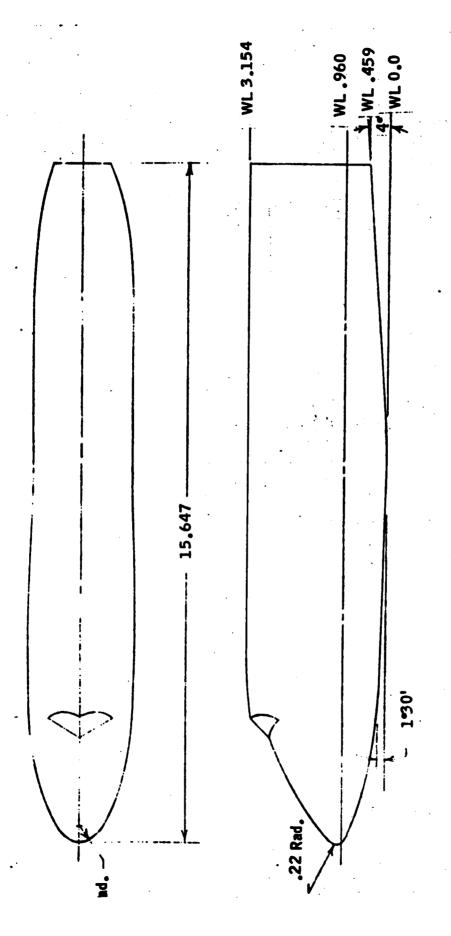
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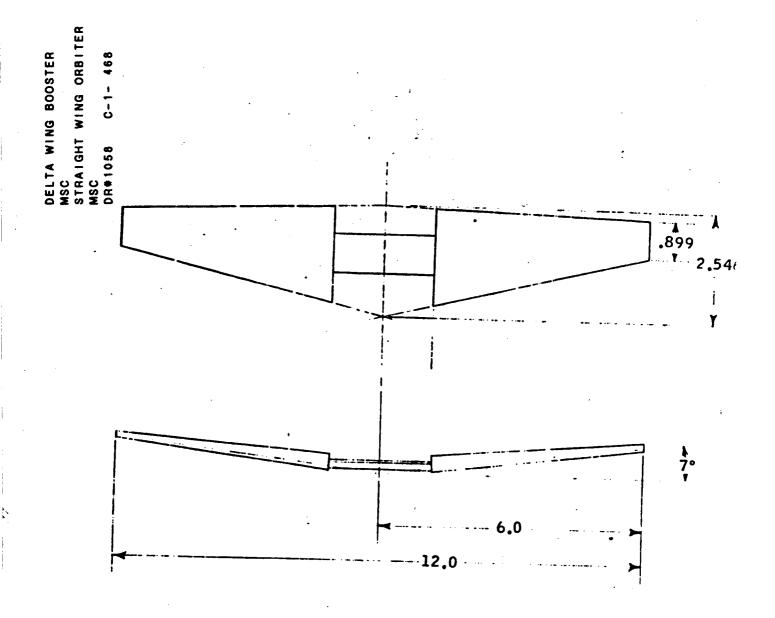


(a) Model Assembly
Figure 1. - 245 Orbiter Configuration. Model S-13A.
All Dimensions are in Inches.



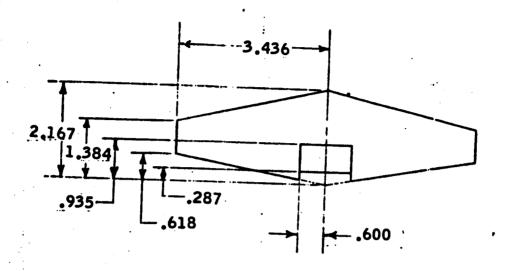
(b) Body - B<sub>11</sub>
Figure 1. - Continued.

DELTA WING BOOSTER
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DR#1058 C-1- 467



(c) Wing - W<sub>6</sub>

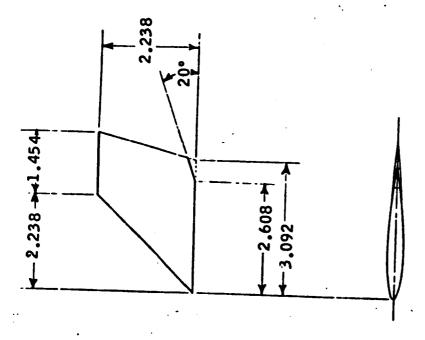
Figure 1. - Contined.





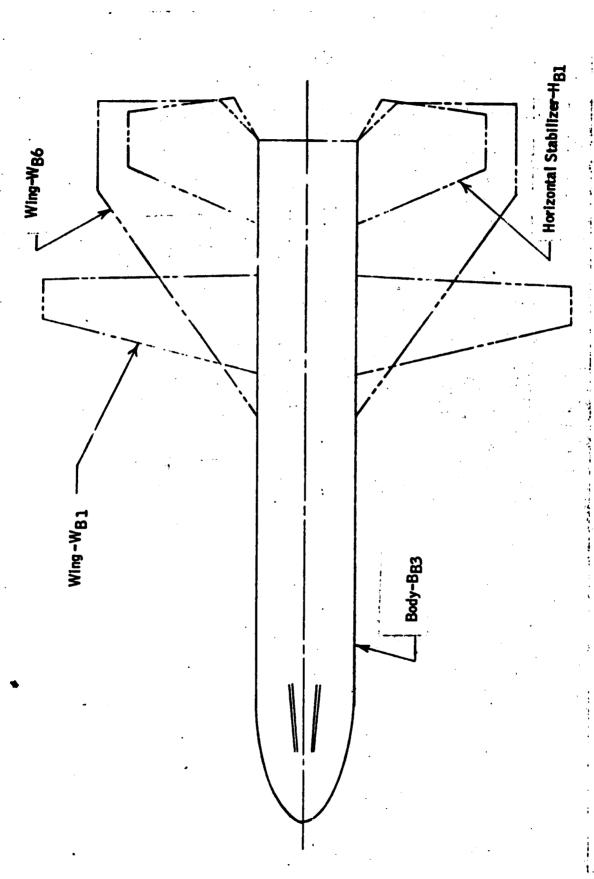
(d) Horizontal stabilizer - H

Figure 1. - Continued



(e) Vertical tail - V<sub>5</sub>

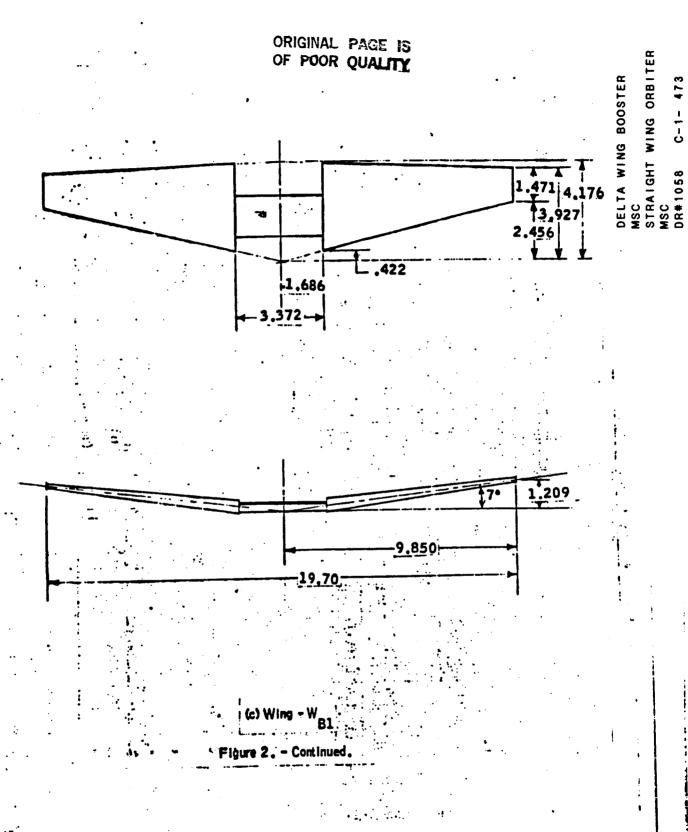
Figure 1. - Concluded.

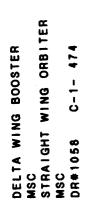


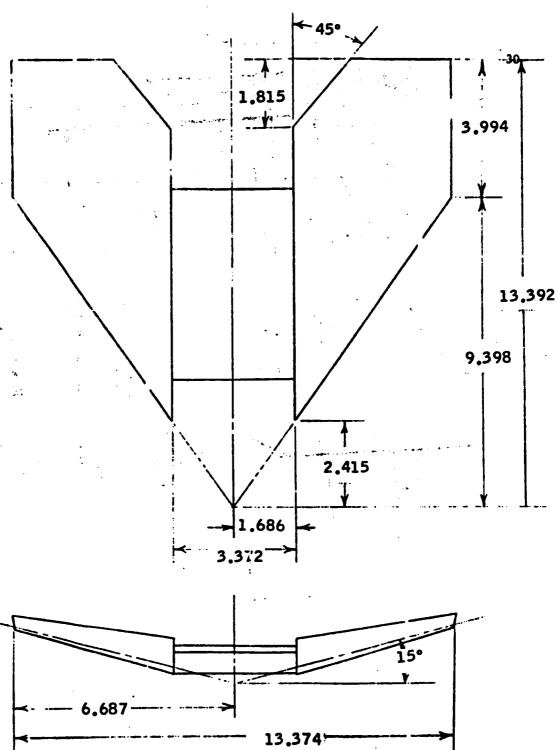
(a) Model Assembly Figure 2. - 251 Booster Configuration. Model 68-13A. All Dimensions are in Inches.

thes. DELTA WING BOOSTER
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(b) Body - B B3 Figure 2. - Continued.



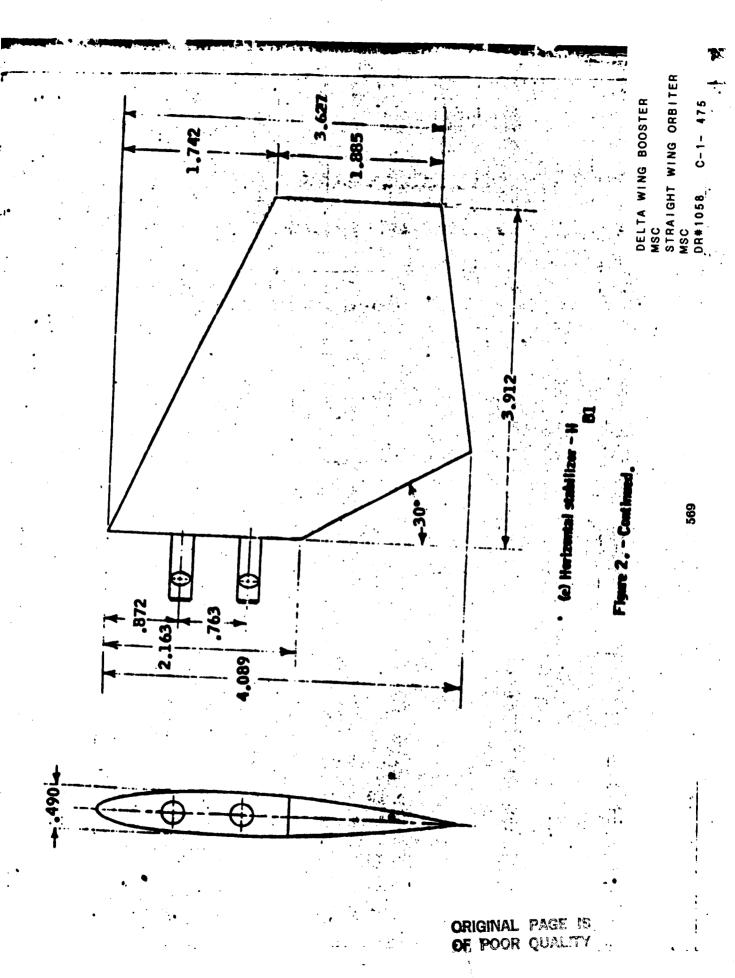


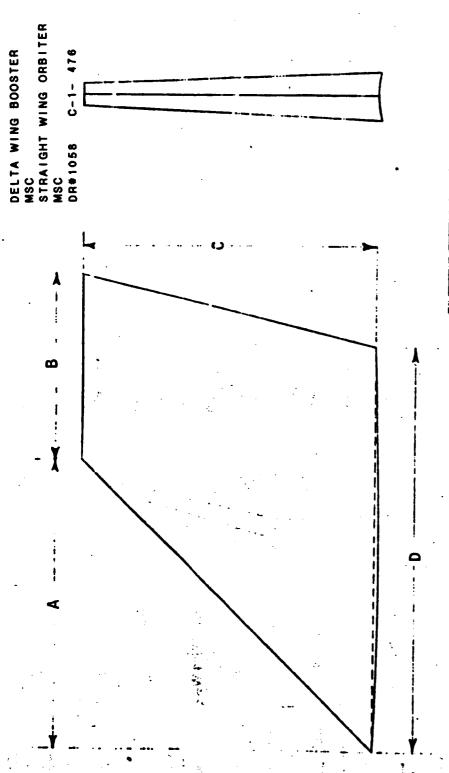


13.374

(d) Wing-W<sub>B6</sub>

Figure 2. - Continued.

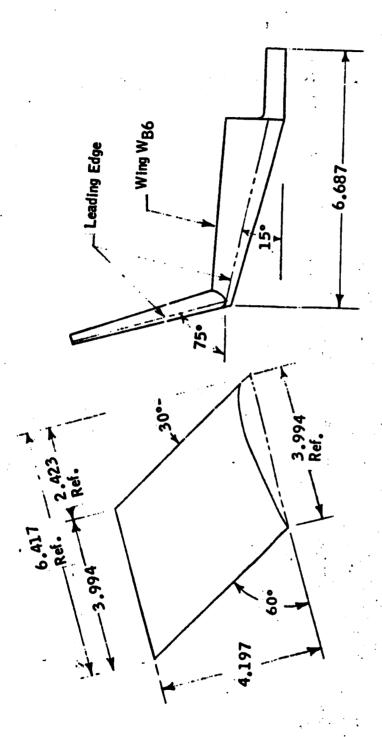




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Figure 2. - Continued. -



(g) Vertical - V<sub>B6</sub> Figure 2, - Concluded,

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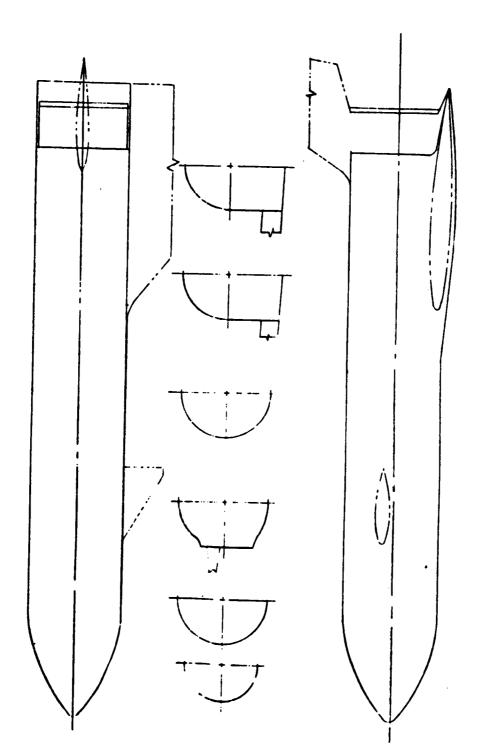


FIGURE 6. BODY B19 - BOOSTER B-15 B-1 CONFIGURATION

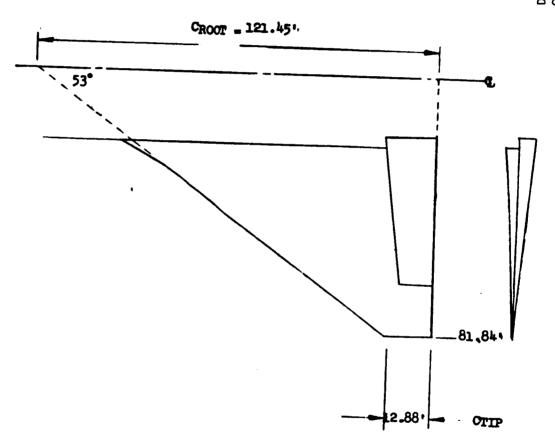


FIGURE 7. WING W14 - BOOSTER CONFIGURATION

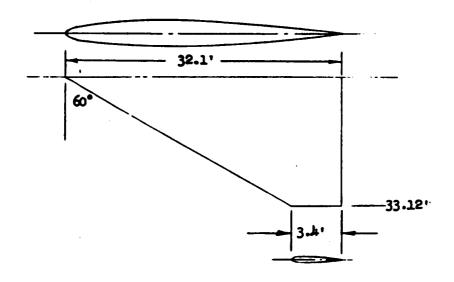


FIGURE 8. CAMARD - CL

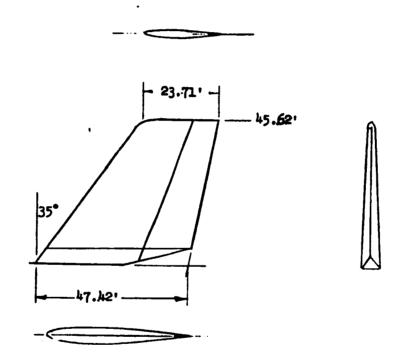


FIGURE 9. VERTICAL TAIL - V7

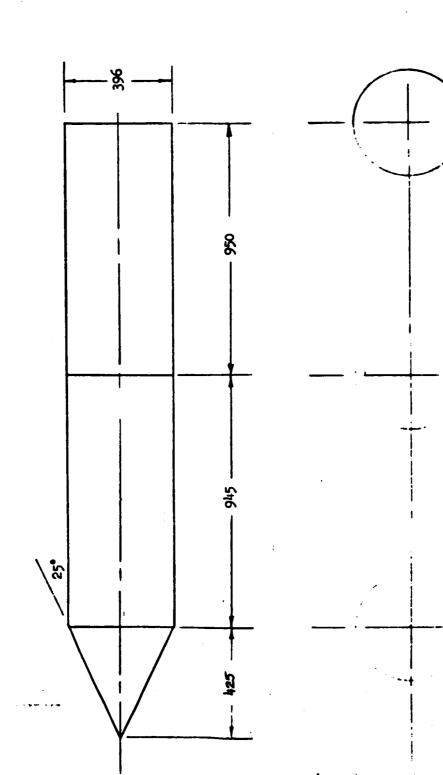


FIGURE 10.ESS VEHICLE - U

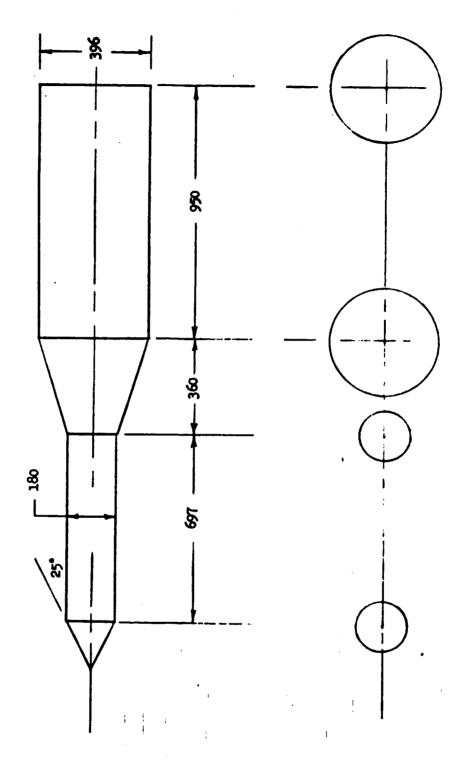


FIGURE 12. ESS VEHICLE - U3

DELTA WING BOOSTER GD/C UNIQUE CONFIGS. ORBITER NR DR#1119 C-1- 485

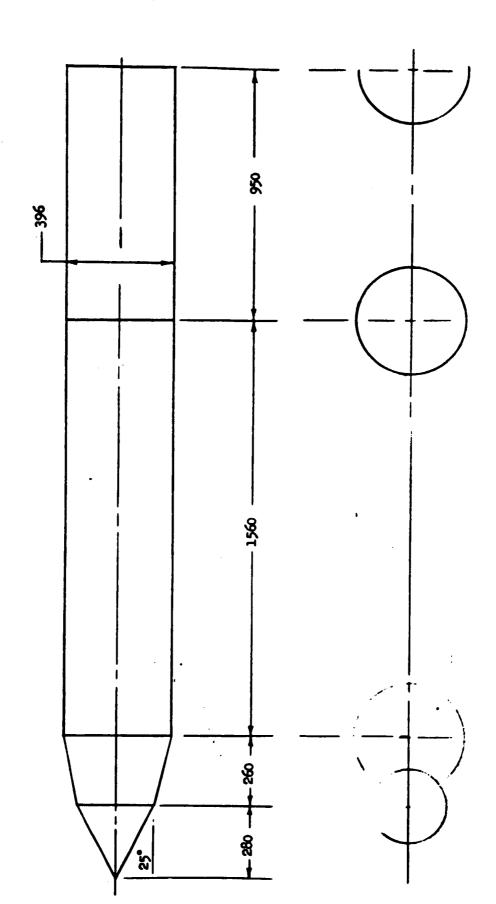
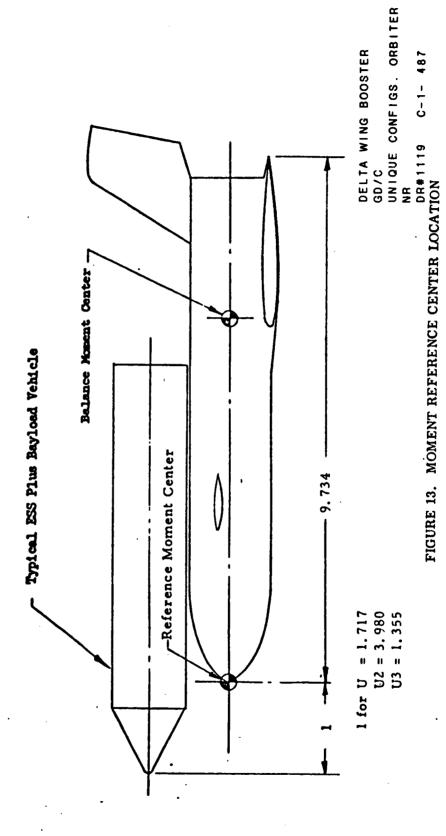
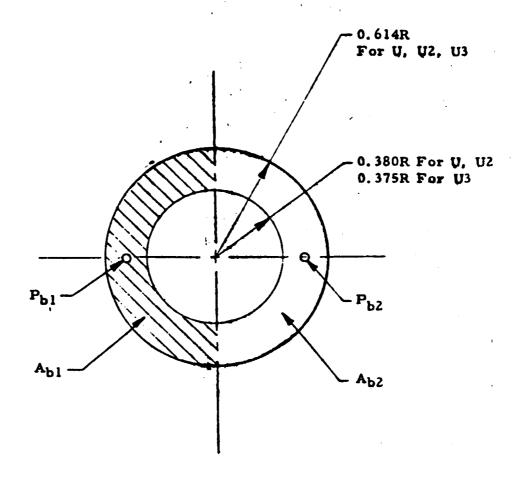


FIGURE 11. ESS VEHICLE - U2

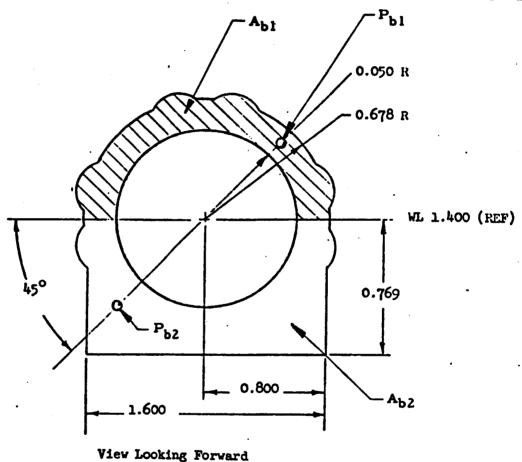


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Note: Location of pressure taps may vary slightly as installation will be made during test setup.

Figure 14. Location of Base Pressure Taps for ESS Alone.



NOTE: Location of pressure taps may vary slightly as installation will be made during test setup.

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Figure 15. Location of Base Pressure Taps for Launch Configurations.

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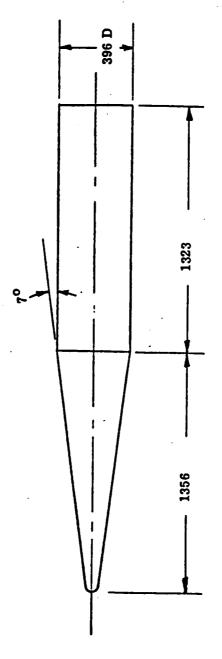


Figure 5. General Arrangement - Reuseable Nuclear Stage

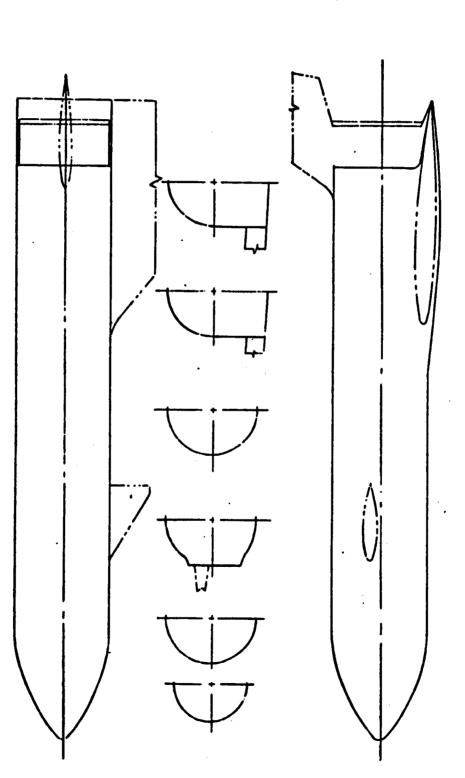
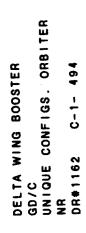


Figure 6. BODY B19 - BOOSTER B-15 B-1 CONFIGURATION

DELTA WING BOOSTER GD/C UNIQUE CONFIGS. ORBITER NR DR#1162 C-1- 493



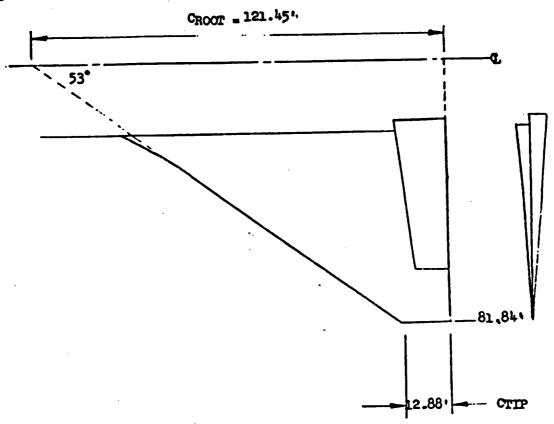


Figure 7. WING W14 - BOOSTER CONFIGURATION

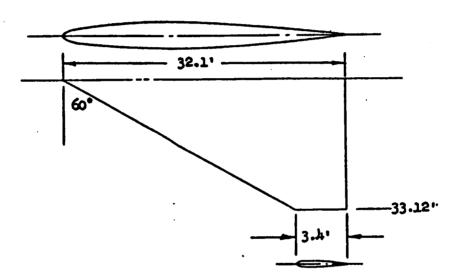


Figure 8. CAKARD - C4

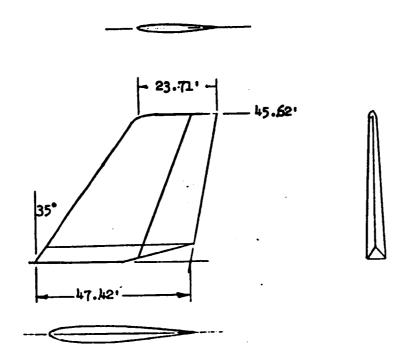


Figure 9. VERTICAL TAIL - V7

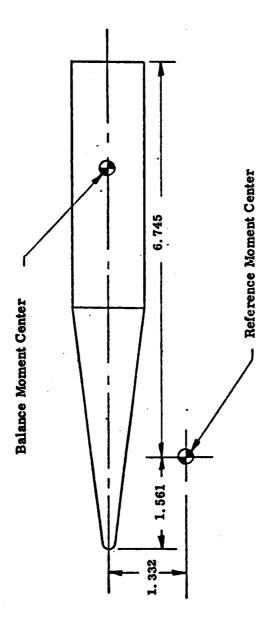


Figure 10. Reuseable Nuclear Stage Reference c.5. Location

DELTA WING BOOSTER GD/C UNIQUE CONFIGS. ORBITER NR DR#1162 C-1-497

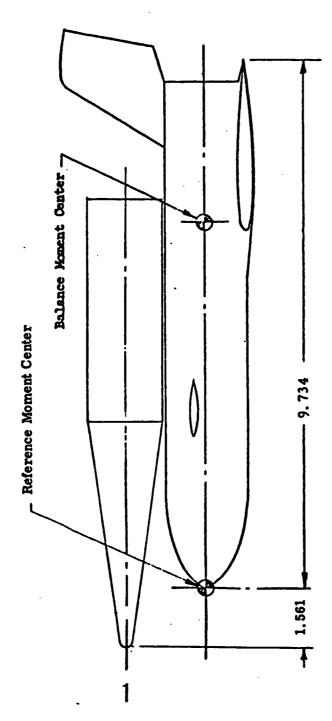
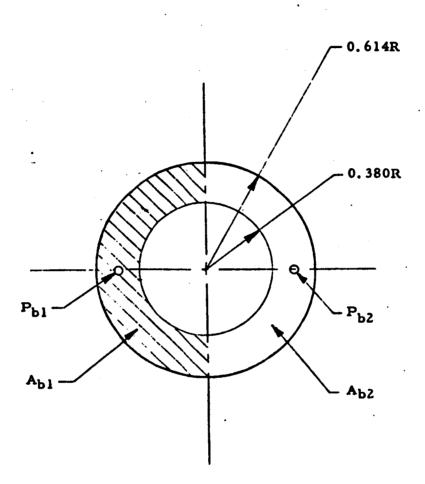


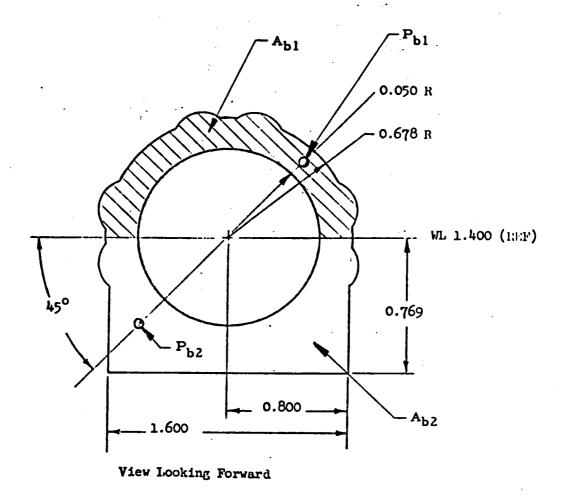
Figure 11. RNS Launch and Booster Alone Reference c.g. Location





Note: Location of pressure taps may vary slightly as installation will be made during test setup.

Figure 12. Location of Base Pressure Taps for RNS Alone.



NOTE: Location of pressure taps may vary slightly as installation will be made during test setup.

Figure 13. Location of Base Pressure Taps
for Booster Alone and RNS Launch Configurations

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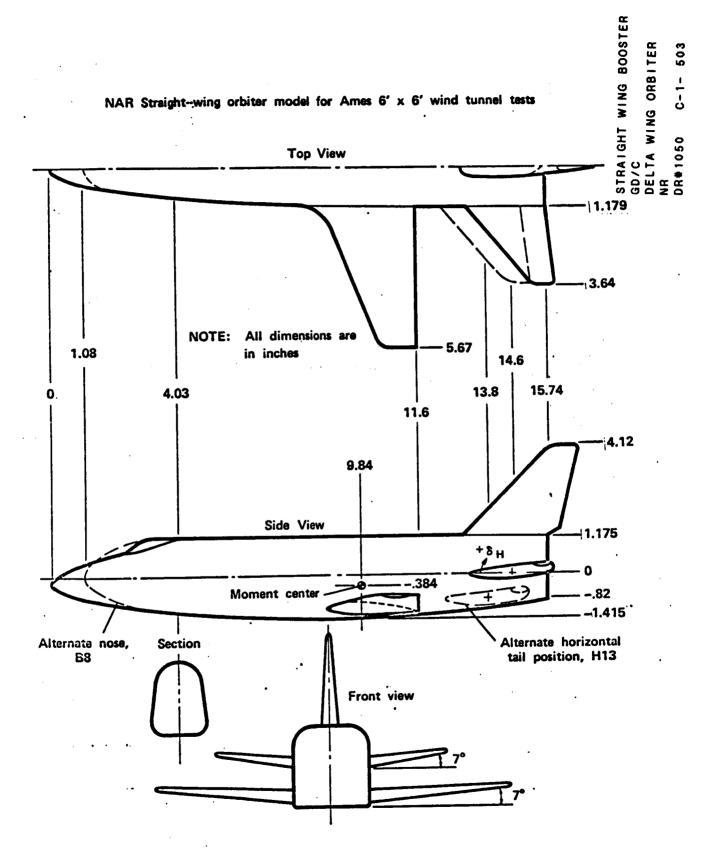


Figure 3 - NAR Straight Wing Orbiter, Three-View 597

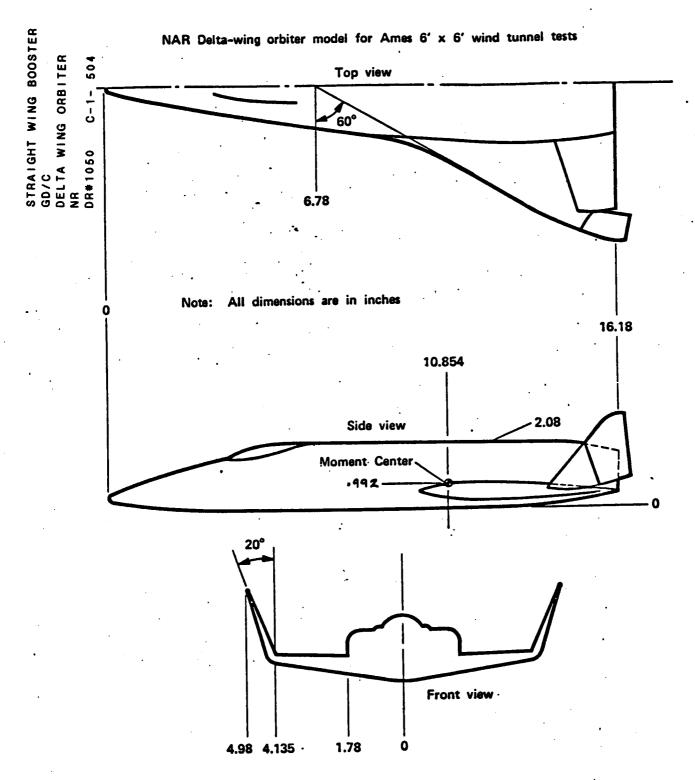
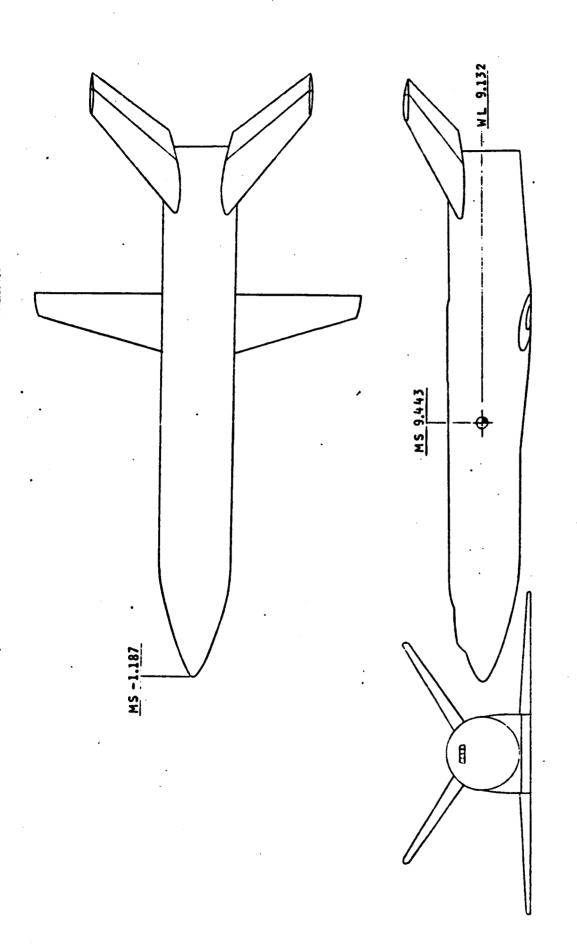
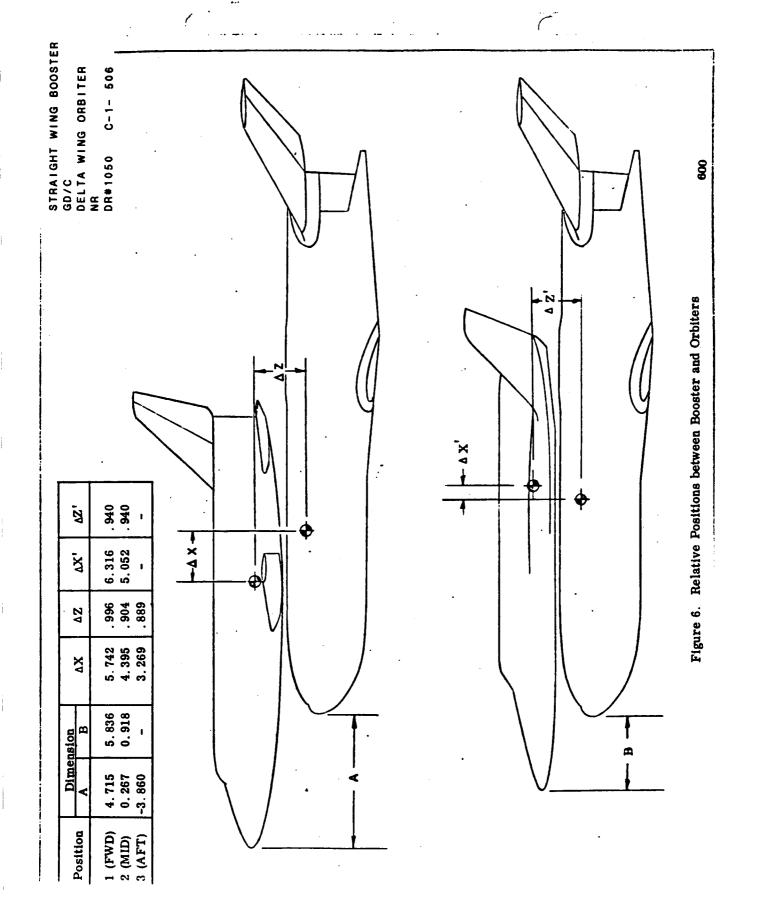


Figure 4.- NAR Delta Wing Orbiter, Three-View



STRAIGHT WING BOOSTER
GD/C
GD/C
Figure 5. General Dynamics Straight Wing Booster, Three-View Sketch, DELTA WING ORBITER
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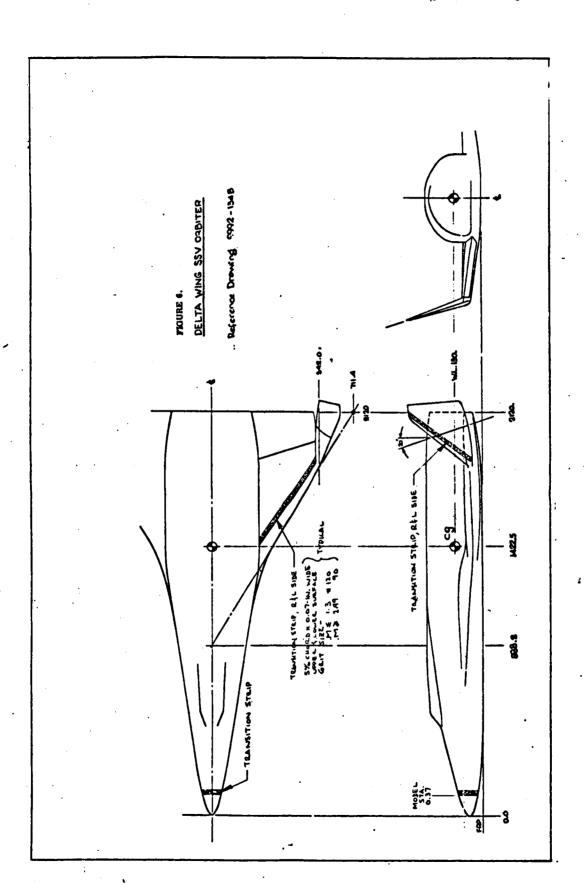
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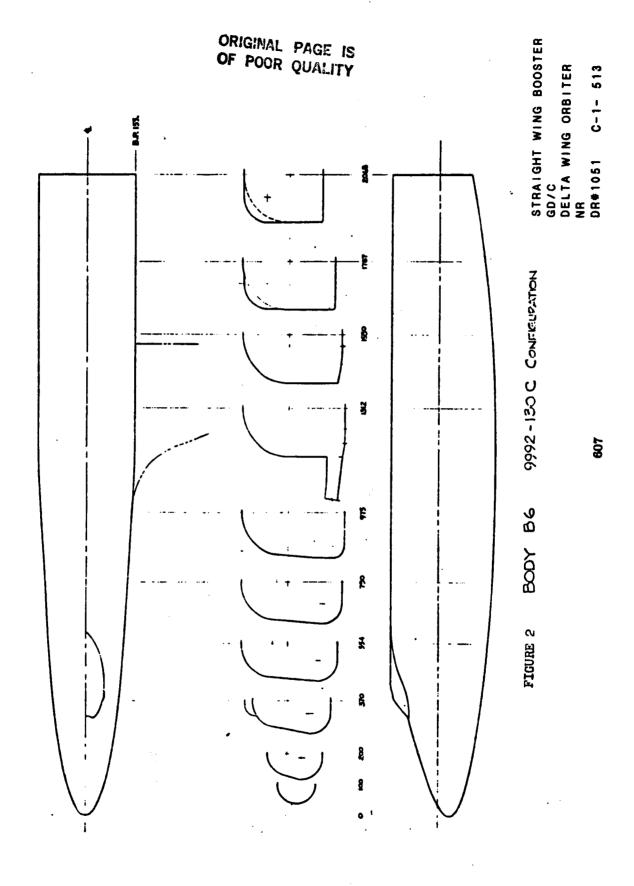
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STRAIGHT WING BOOSTER GD/C DELTA WING ORBITER NR DR#1051 C-1-511

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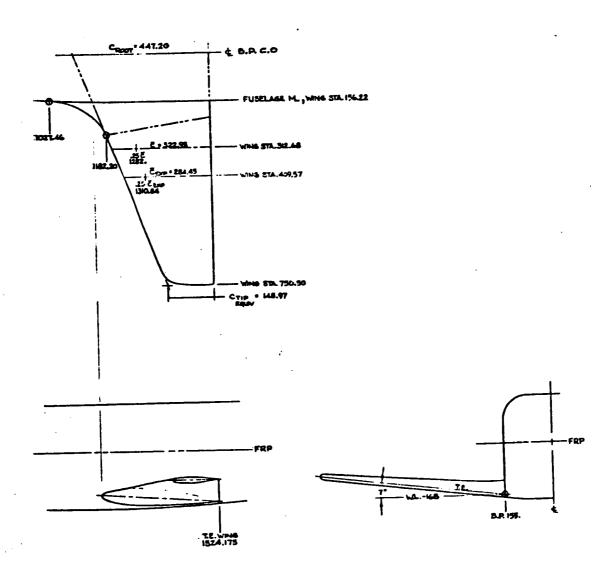
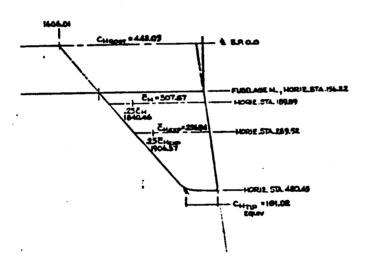
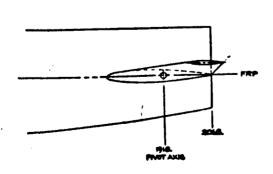


FIGURE 3

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9992-130 C CONFIGURATION 9992-130 G WING POSITION ORIGINAL PAGE IS OF POOR QUALITY





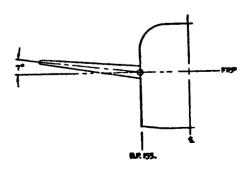
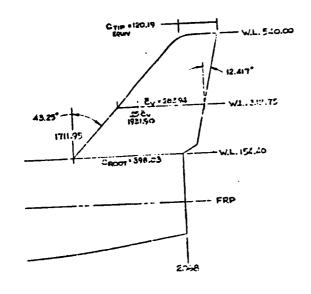


FIGURE 4 HORIZONTAL STABILIZER HIZ 9992-130C CONFIGURATION

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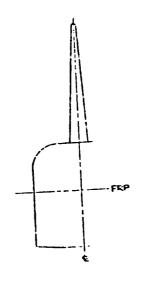
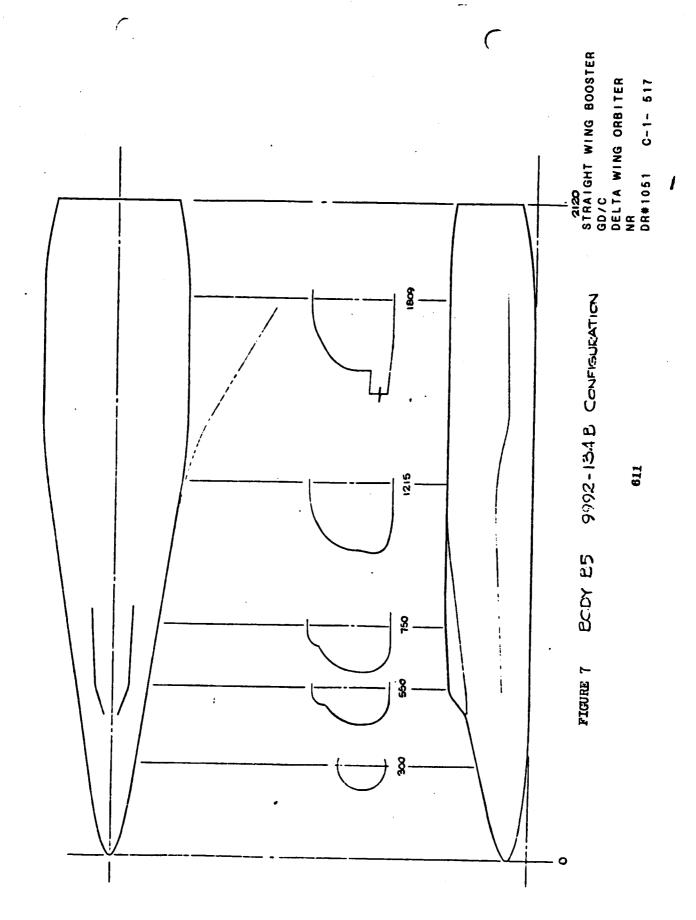
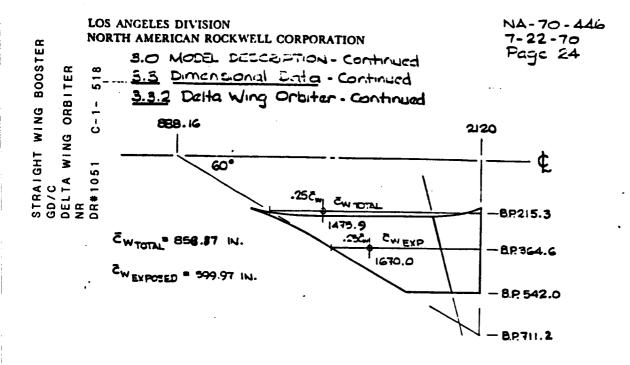


FIGURE 5 VERTICAL STABILIZER V5 9992-1800 CON MEATION





CHORD (B.P. 240.0)
OCC9 - 64 SERIES AIRFOIL

1-5°

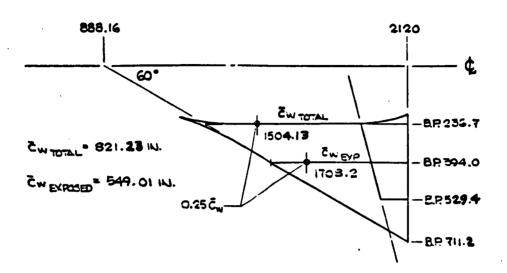
TIP CHORD (B.P. 542.0) 0012 - 64 SERIES AIRFOIL

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FIGURE 8.

WING WIE 9992-1345 CONFIGURATION

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STRAIGHT WING BOOSTER GD/C DELTA WING ORBITER NR DR#1051 C-1-519

CHCDD (B.P. 240.0)

0009-64 SERIES AIRFOIL

-5°

TIP CHORD (B.P. 542.0)

FIGURE 9. WING WIA 9992-1848 CONFIGURATION CONFLICT DECEMBER AND ALCOHOLD THE

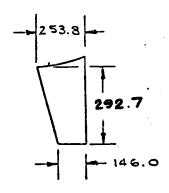
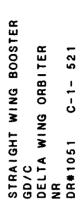


FIGURE 10.

ELEVON, E2 - Elevon Used With Wing Wig
E3 - Elevon Used with Wing Wif

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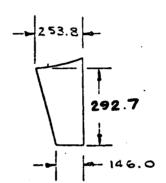
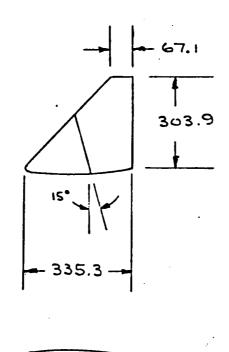


FIGURE 11.

ELEVON, E2 - Elevon Used with Wing Wig

E3 - Elevon Used with Wing Wi4

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0012-64 SERIES AIRFOIL

FIGURE 12
VERTICAL STABILIZER VIA 9992-134B CONFIGURATION

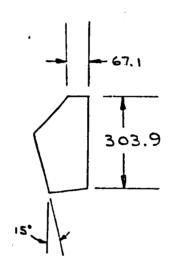


FIGURE 13

PUDDER - 84

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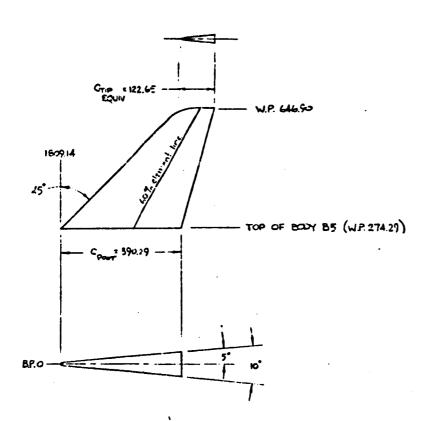
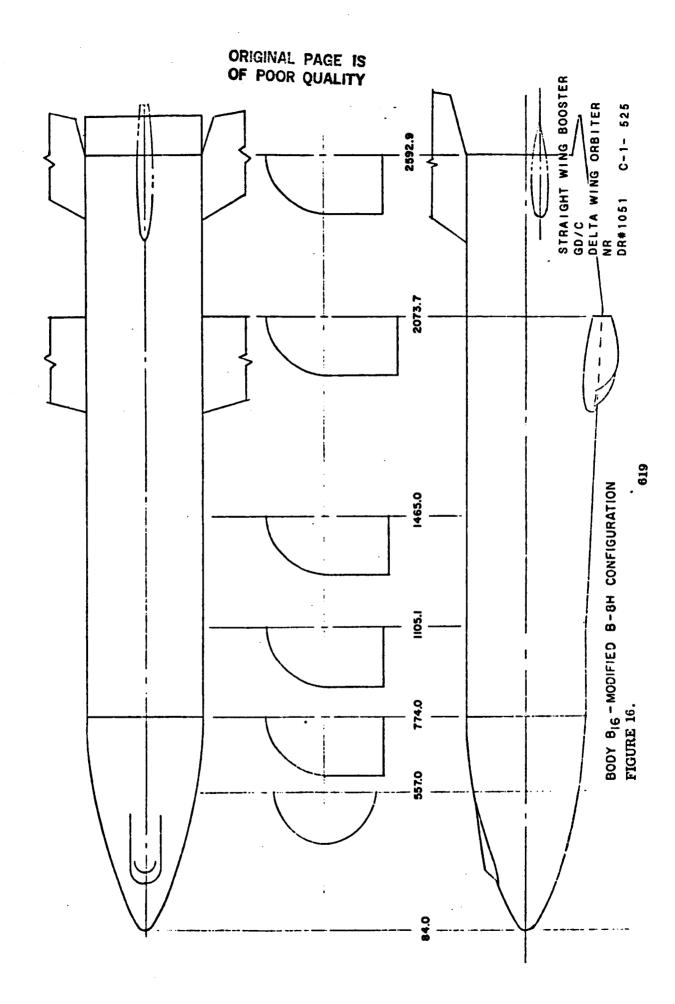


FIGURE 14.

VERTICAL STABILIZER VIT



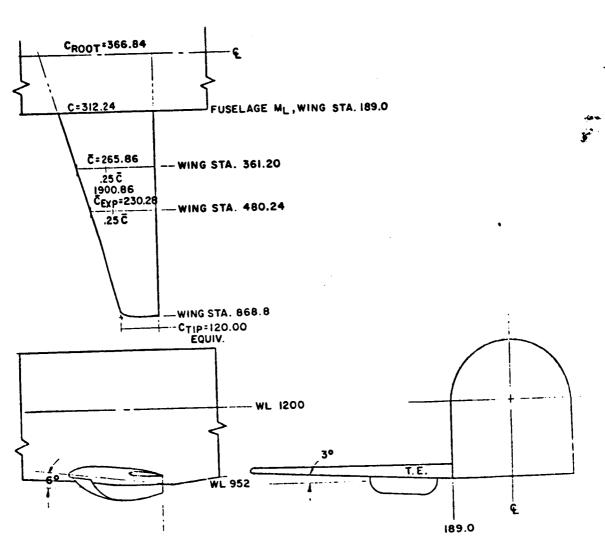
10-23-70 Revision

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1- 526

MODEL DESCRIPTION - Continued

Dimensional Data - Continued

Straight Wing Booster - Continued



WING W6 MODIFIED B-8H CONFIGURATION FIGURE 17.

NA-70-435 10-9-70

10-23-70 Revision

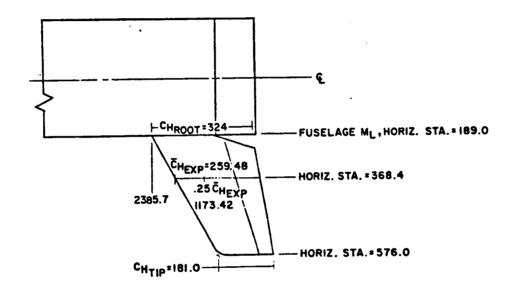
10-23-10 MeV.

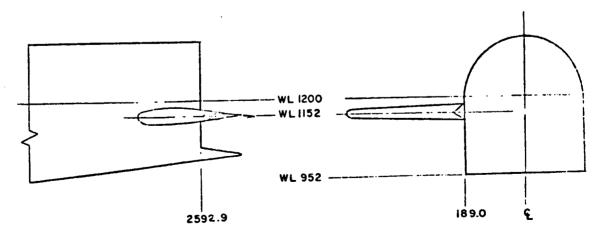
<u>Dimensional Data</u> - Continued

MODEL DESCRIPTION - Continued

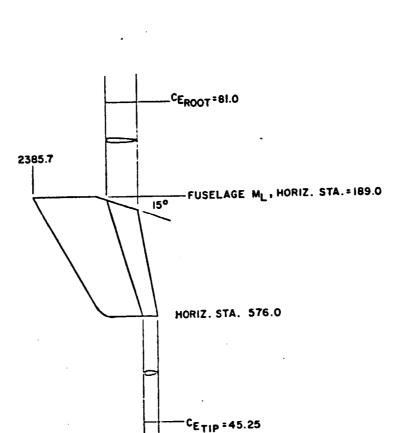
Straight Wing Booster - Continued

STRAIGHT WING BOOSTER FIND GD/C BOLTA WING ORBITER NR NR DR#1051 C-1-527





HORIZONTAL TAIL T8 FIGURE 18.



10-9-70

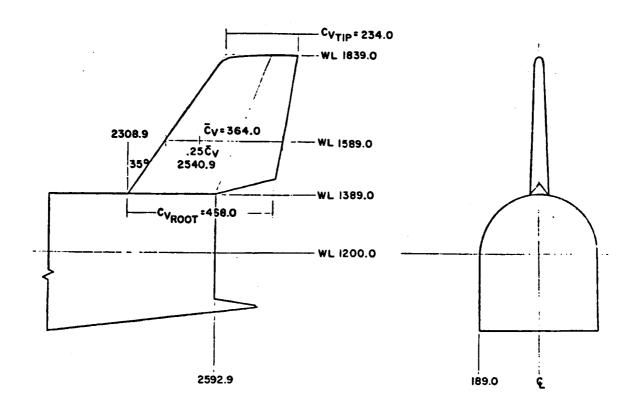
10-23-70 Revision

HORIZONTAL TAIL ELEVATOR (T<sub>8</sub>) FIGURE 18. (Cont.)

10-23-70 Revision

STRAIGHT WING BOOSTER BOOK CON

MODEL DESCRIPTION - Continued Dimensional Data - Continued Straight Wing Booster - Continued



VERTICAL TAIL V6 FIGURE 19.

LOS ANGELES DIVISION

NORTH AMERICAN ROCKWELL CORPORATION

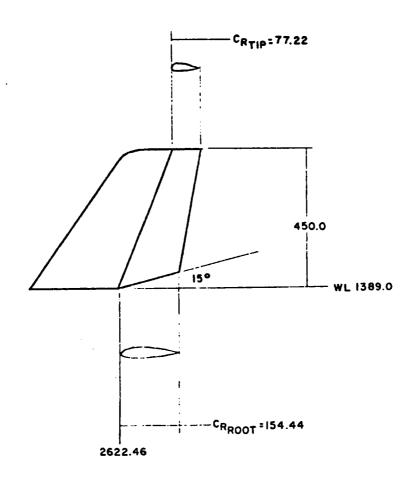
NA-70-435 10-9-70

10-23-70 Revision

MODEL DESCRIPTION - Continued

Dimensional Data - Continued

Straight Wing Booster - Continued



VERTICAL TAIL RUDDER (V<sub>6</sub>) FIGURE 19. (Cont.)

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TABLE I DATA SET/RUN NUMBER COLLATION SUMMARY TEST 66-511

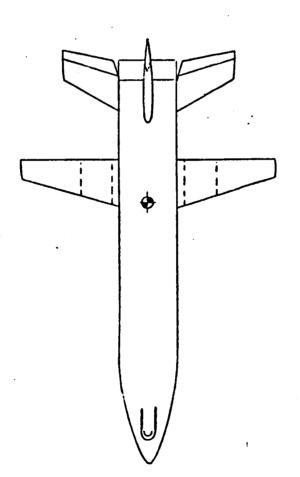
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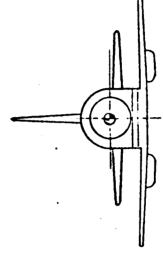
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FIGURE B. LAUNCH CONFIGURATIONS, GENERAL ARRANGEMENT



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(.2.M TE4.91) at 8.521s



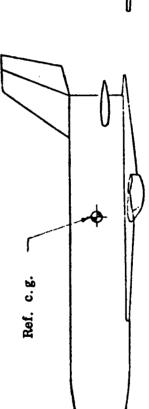
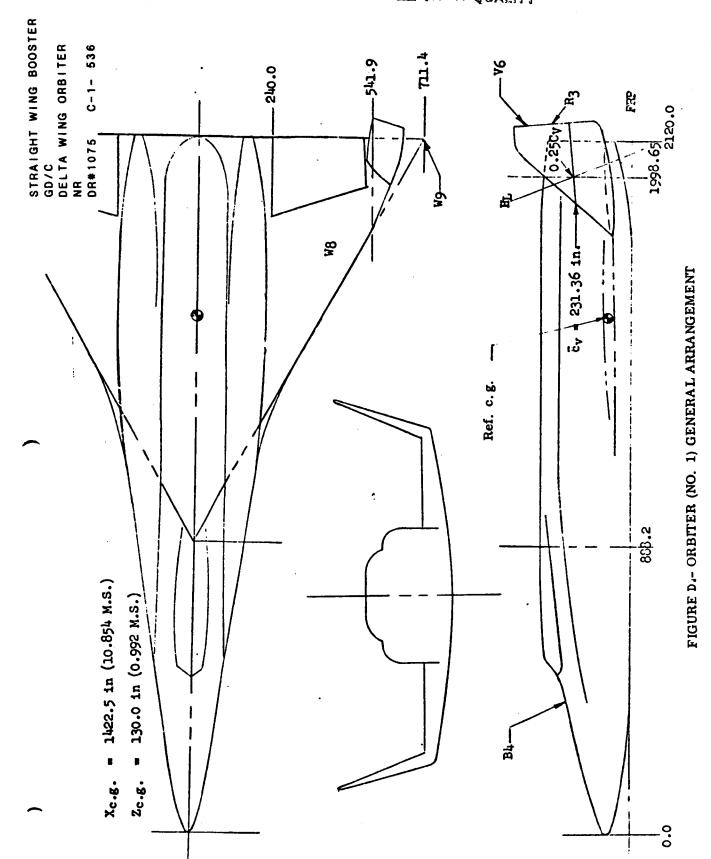
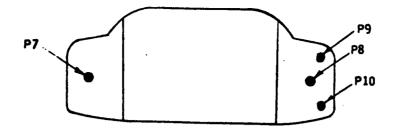


FIGURE C. - GENERAL ARRANGEMENT, BOOSTER

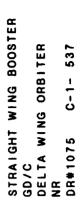
STRAIGHT WING BOOSTER GD/C DELTA WING ORBITER NR DR\*1075 C-1- 535

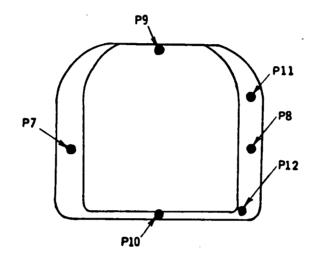


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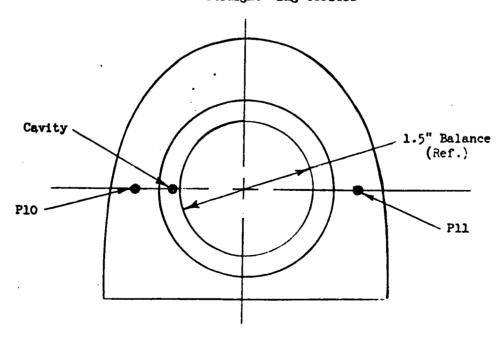


Delta Wing Orbiter



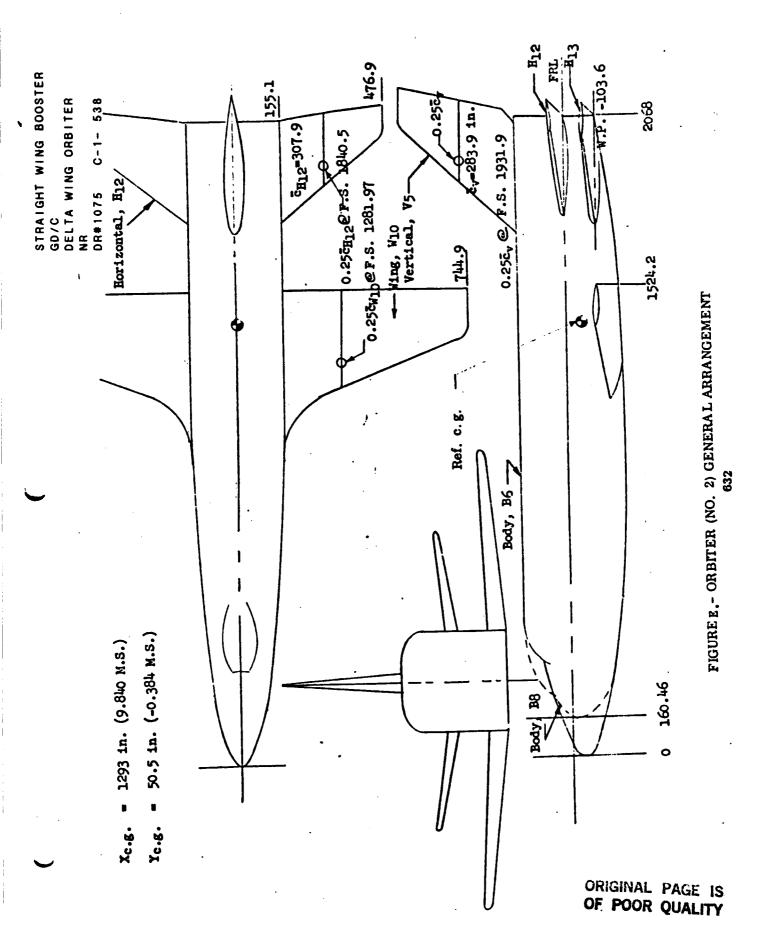


Straight Wing Orbiter



Booster

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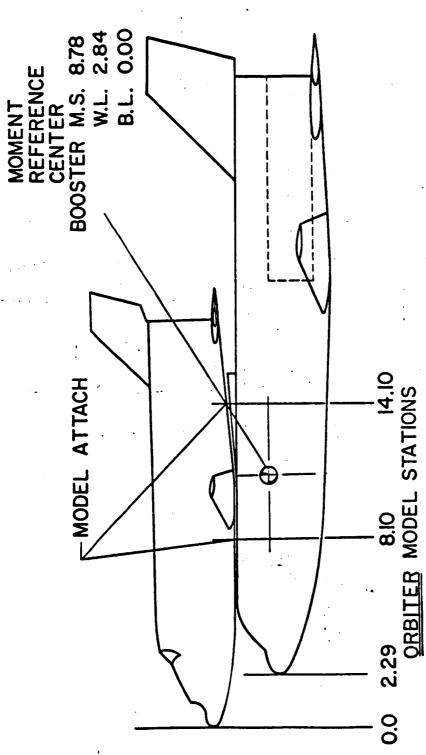


Figure 2. Sketch of MSC Launch Configuration Model

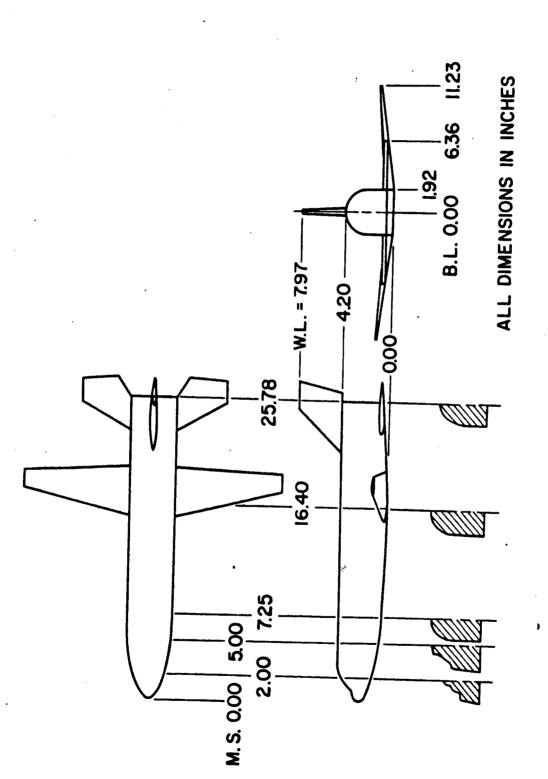


Figure 3. Plan, Elevation and End View of MSC Booster Model

STRAIGHT WING BOOSTER MSC STRAIGHT WING ORBITER MSC DR#1042 C-1- 541

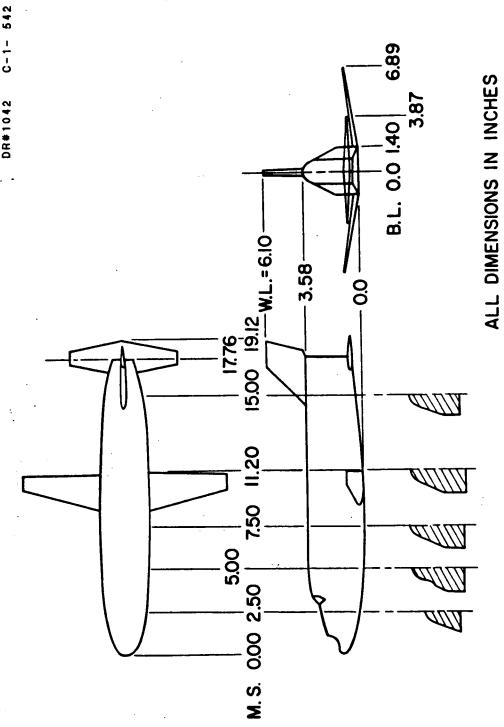
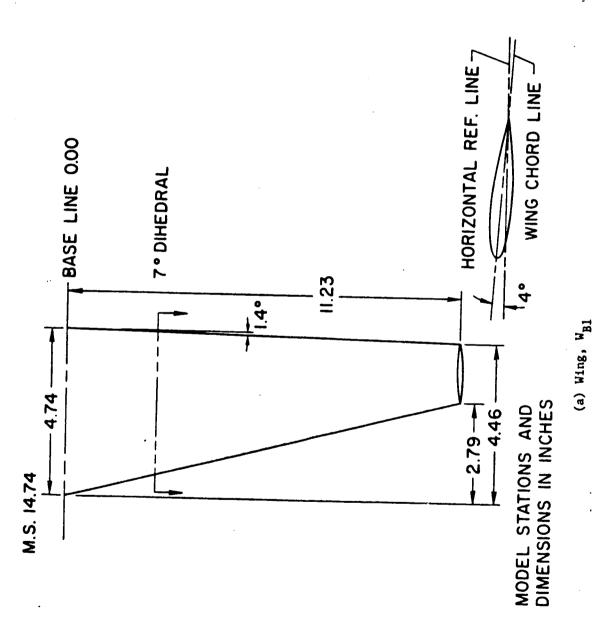


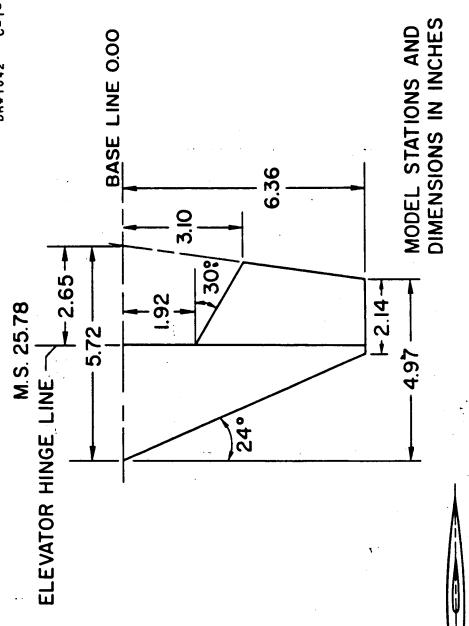
Figure 4. Plan, Elevation and End View of MSC Orbiter Model



STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1042 C-1- 543

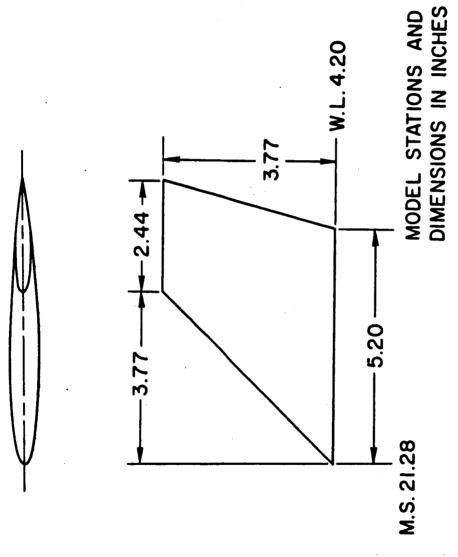
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Figure 5. Sketches of Wing, Horizontal and Vertical Stabilizers for the Booster Model STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR\*1042 C-1- 544



(b) Horizontal stabilizer, H<sub>B1</sub>

Figure 5.- Continued.



(c) Vertical stabilizer,  $v_{\rm Bl}$  Figure 5.- Concluded.

STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR\*1042 C-1-545



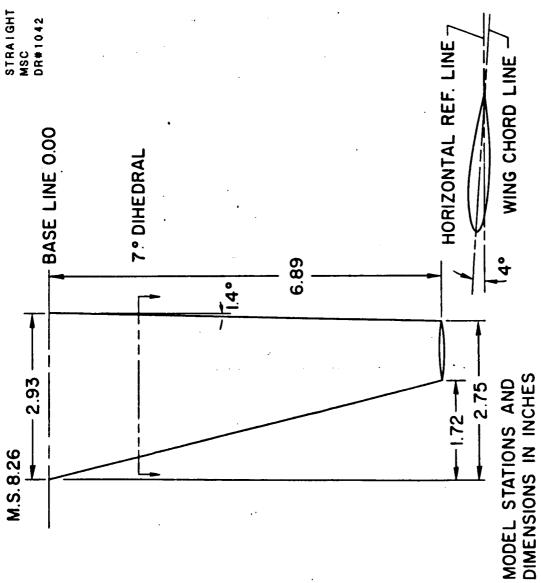
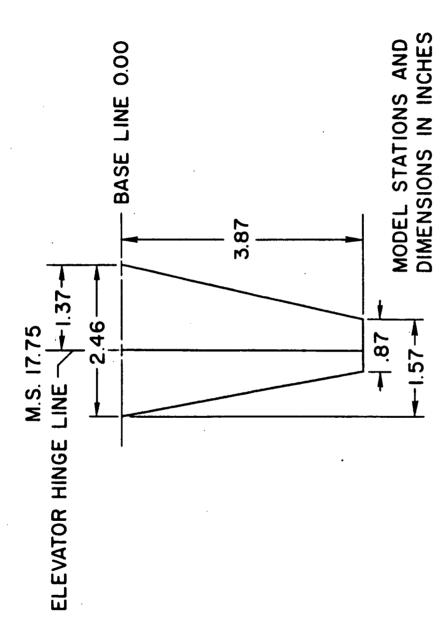


Figure 6. Sketches of Wing, Horizontal and Vertical Stabilizers for the Orbiter Model

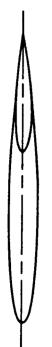
(a) Wing, W<sub>6</sub>

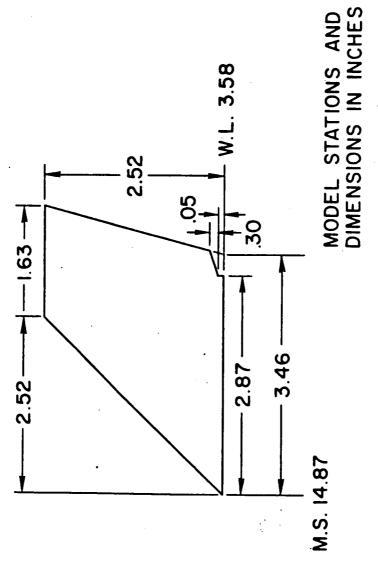


STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR\*1042 C-1-547

(b) Horizontal stabilizer,  $H_{f 14}$ 

Figure 6.- Continued.



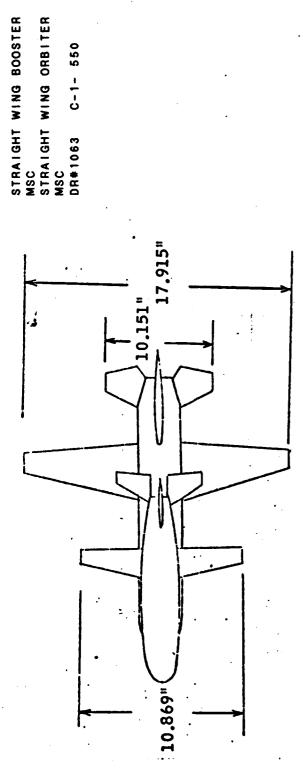


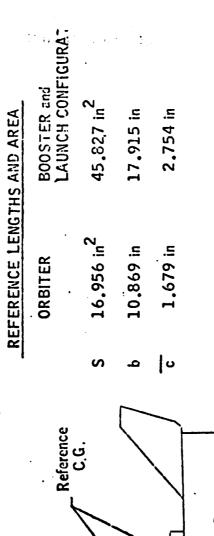
(c) Vertical stabilizer,  $V_5$ 

Figure 6.- Concluded.

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-8.50"

a) Straight Wing Orbiter Mated to the Straight Wing Booster

20,58"

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0.98" 少

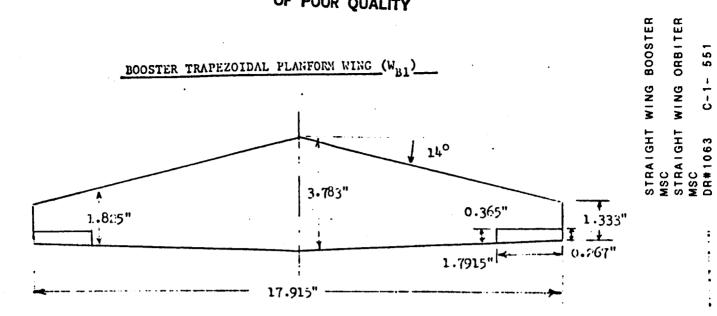
2.607"

465"

0.064 Cap

Figure 4. - Straight Wing Beester Launch Configuration

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BOOSTER HORIZONTAL TAIL (HB1)

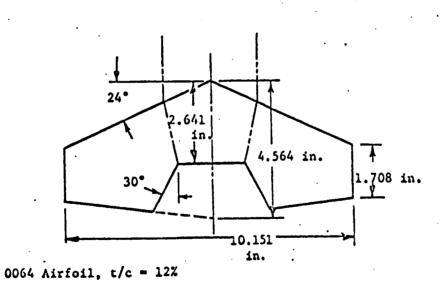
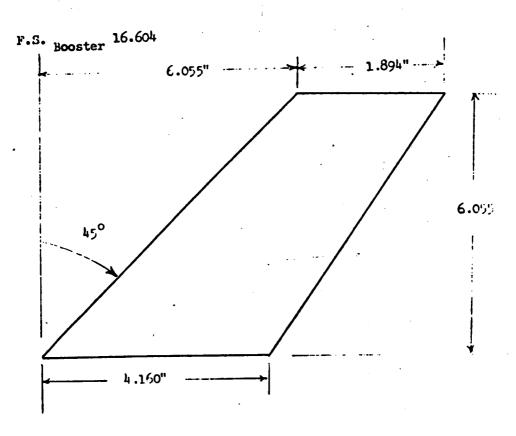


FIGURE 5. BOOSTER TRAPEZOIDAL PLANFORM WING  $(W_{B_1})$  AND HORIZONTAL TAIL  $(H_{B_1})$ 



Tail Parameters:

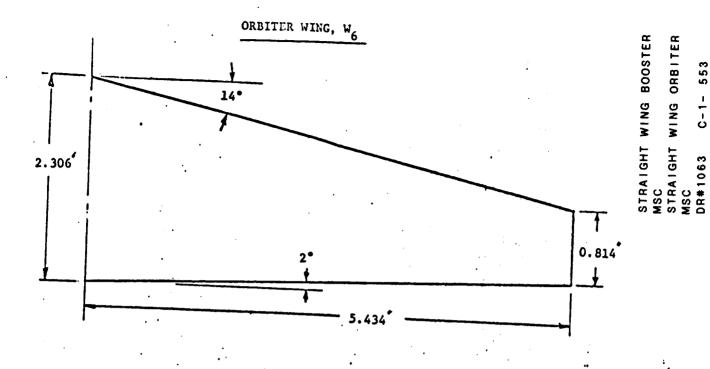
Aspect Ratio = 2.0 Taper Ratio = 0.455 Airfoil - 0012-64 Full Scale:

Area = 1988.75 ft.<sup>2</sup> Span = 63.073 ft.

Model Scale:

Area = 18.3284 in. 2 Span = 6.055 ft.

Figure 6. - Booster vertical stabilizer, V<sub>B7</sub>.



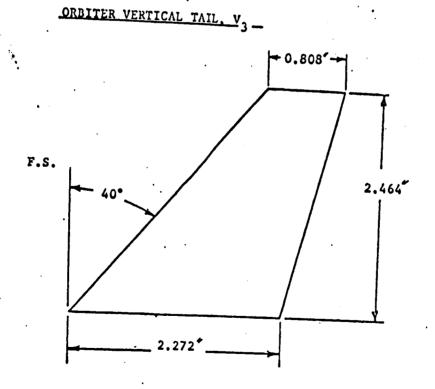


FIGURE 7. ORBITER TRAPEZOIDAL PLANFORM WING (W $_6$ ) AND VERTICAL TAIL (V $_3$ )



## ORBITER HORIZONTAL TAIL, H

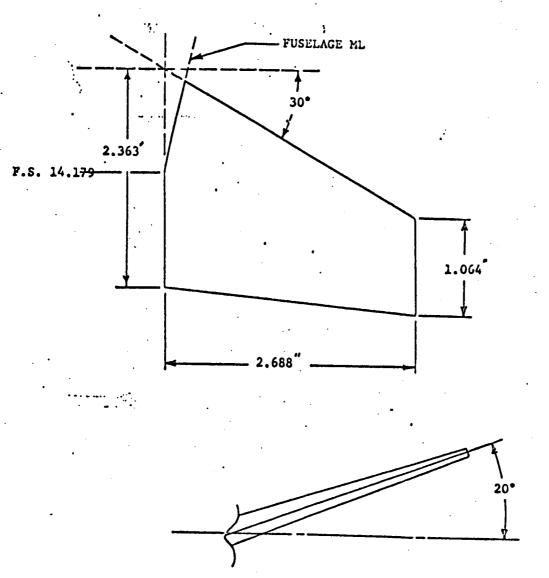


FIGURE 8. ORBITER HORIZONTAL TAIL

TABLE IV

DATA SET/RUN NUMBER TEST AMES 66-546

COLLATION SUMMARY

STUDY OF BASIC LAUNCH CONFIGURATION DATA IN THE ANES 6- by 6-Foot Supersonic Wind Tunnel

O PRETEST

13 19 15 IC.1M IC.Y.  aA = -12 to 15', a = -1  aB = -8 to 8. a = -8  aD = -6, -4, -2, 0, 2,

.(

UNIQUE CONFIGS. ORBITER GAC STRAIGHT WING BOOSTER TEST RUN NUMBERS MASA-MSFC-MAF A POSTTEST -IDPVAR(1) DPVAR(2) NDV C-1- 556 O PRETEST MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) 6 DR#1122 9 COLLATION SUMMARY
ORBITER BALANCE DATA OF VARIOUS LAUNCH CONFIGURATIONS IN THE AMES 1.2 1.5 2.0 13 24 36 9 45 3 31 DATA SET/RUN NUMBER 64 œ 7 25 32 95 41 2 6- by 6-Foot Supersonic Wind Tunnel 2 0 42 47 27 22 37 IC N TABLE IV. - CONTINUED 6. 3 48 29 43 2 38 9 8 12 35 39 7 67 24 A 21 NO. of RUNS PARAMETERS/VALUES ICLN . ICSI COEFFICIENTS: AA = -12, -8, -4, -2, 0, 2, 4, 8, 12, 15 33 TEST AMES 66-546\_ 25 gB = -8, -4, -2, 0, 2, 4, 8 BC = -5, 0, 5, 10 SCHD. 0 0 0 0 ٥ TO THE TOTAL A q 9 13 CONFIGURATION (B)1(0)1A1T1 (B)1(0)1A1 (B)1(0)1AST1. (B)1(0)1A3T1 (B)1(0)144I1 (R)1(0)1A3T1 (B)1(0)1A1T1 (B)1(0)1A3 (B) 1(O) 1A1 CILLLIGI SCHEDULES DENTIFIER a or B DATA SET RAWADI RAW\$03 RAVA09 RAH405 RAVADA RAWA07 DIVERS RAWAOR

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	COLLATION SUMMARY ONE DATA AT HIGH ANGLES OF ATTACK IN 6- by 6-Foot Supersonic Wind Tunnel
TEST AMES 66-546	COLL/ DATA AT HI by 6-Foot S
AMES	ALONE 6-
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OPRETEST

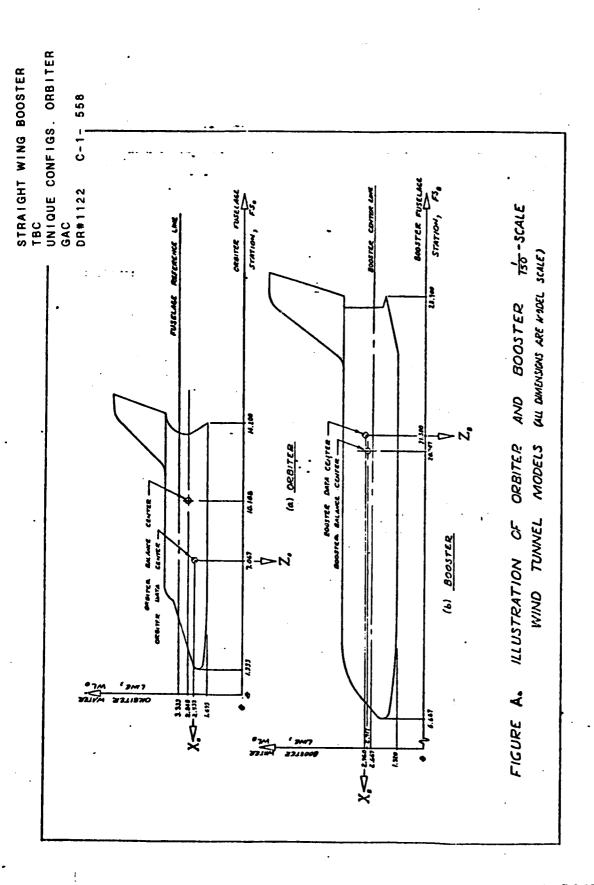
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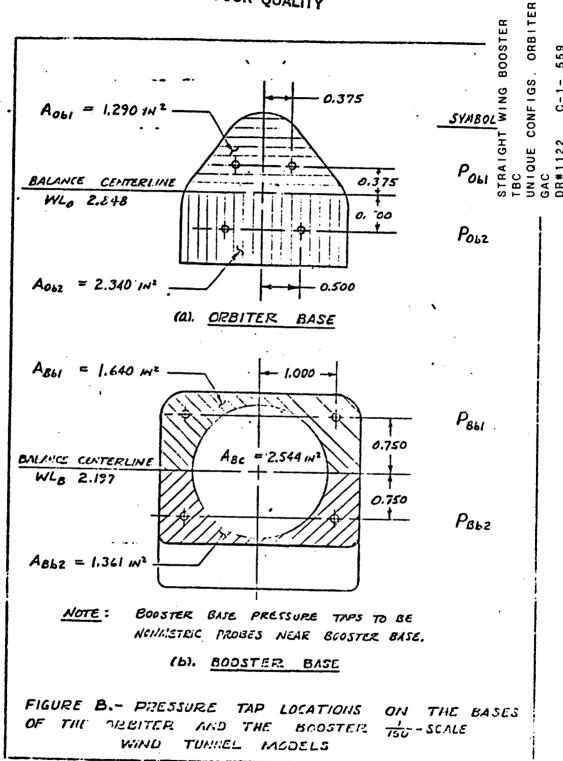
NASA-MSFC-MAF

BC = -5, 0, 5, 10

s or B Schedules STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1122 C-1-557







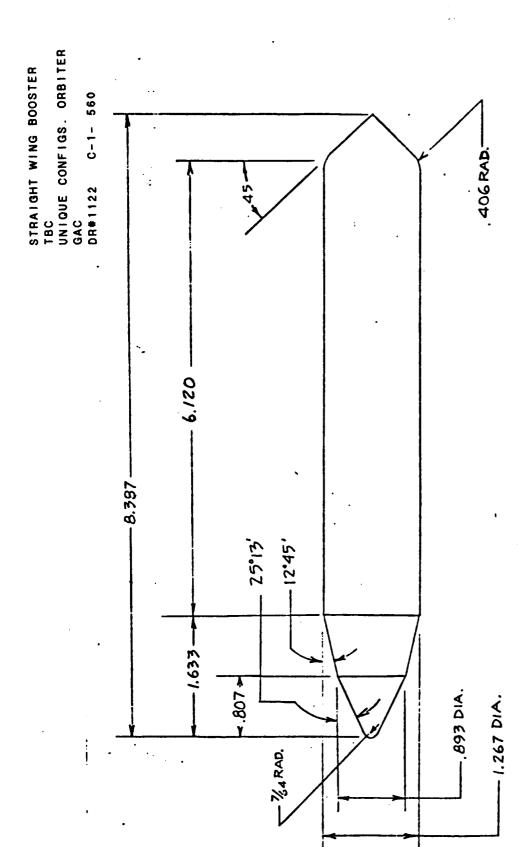


Figure C.- T<sub>1</sub> external tanks (1/150 scale).

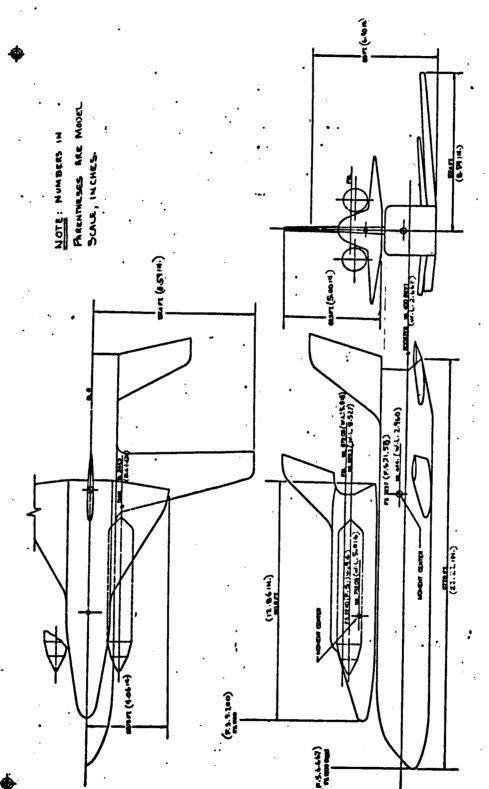


Figure D.- Launch configuration with orbiter mounted in the A<sub>1</sub> position, showing moment center locations.

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STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1122 C-1-561

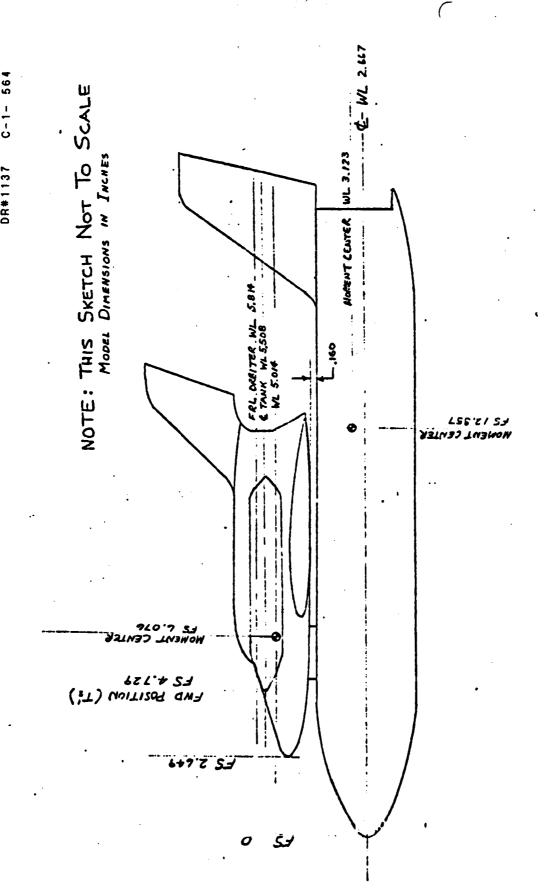
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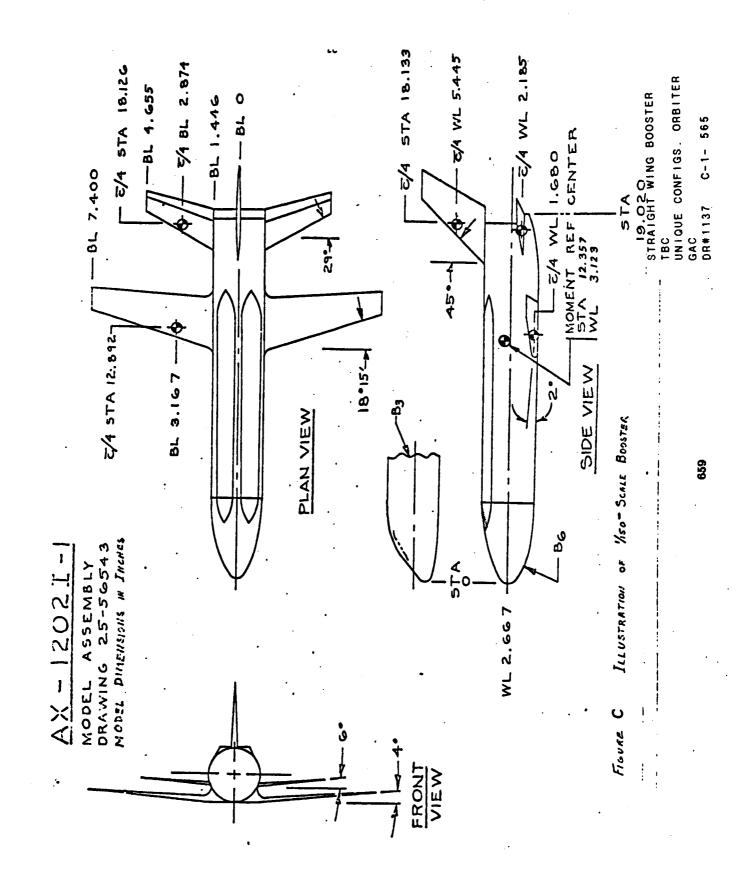
TABLE 1 (COMCLUBED)  TEST AMES 66-551 DATA SET COLLATION SHEET  1/150-SCALE BOOSTER PLUS ORBITER LAUNCH CONFIGURATION)  TESTS IN THE AMES L'X6" WINDTUNNEL
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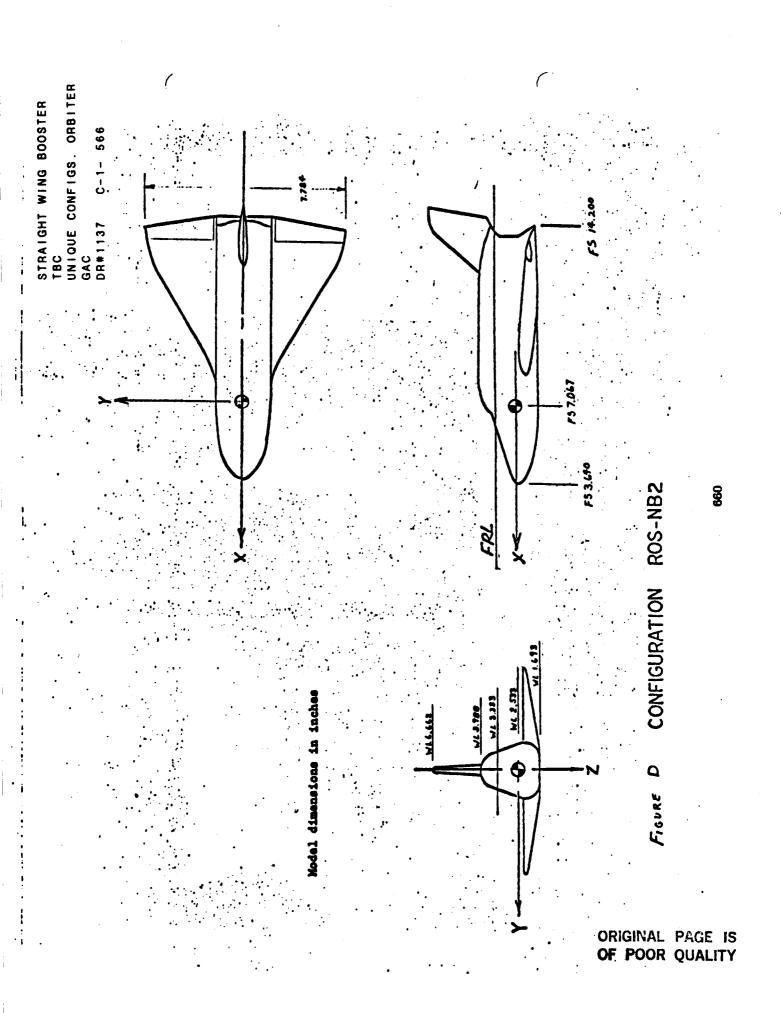
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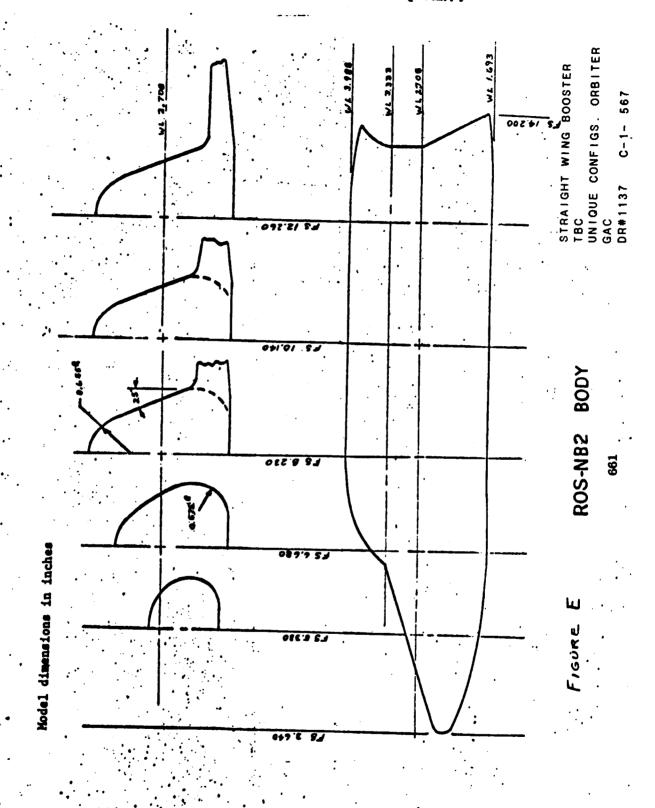
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REFERENCE SYSTEM BOOSTER USING LAUNCH CONFIGURATION FIG. B







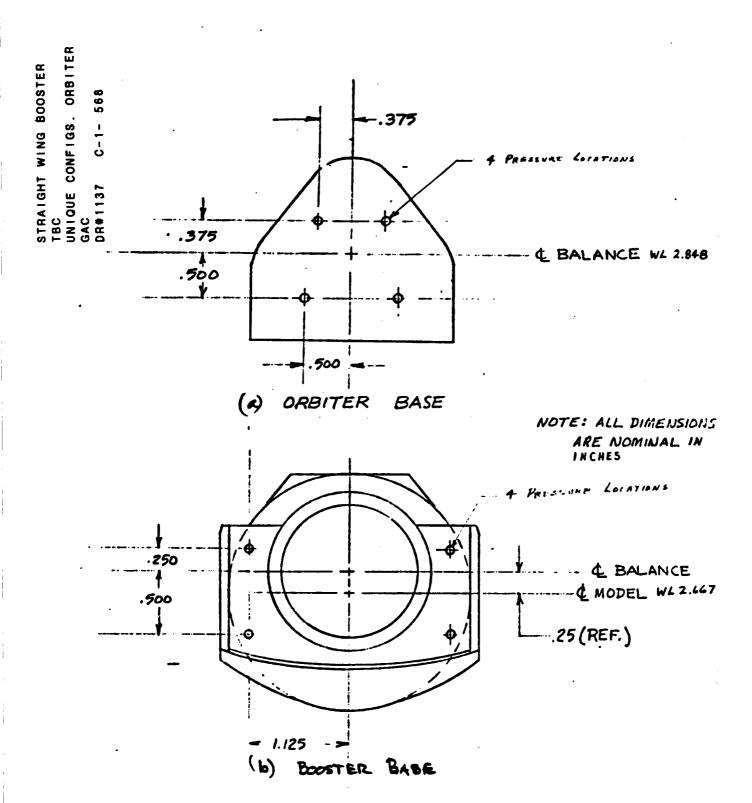
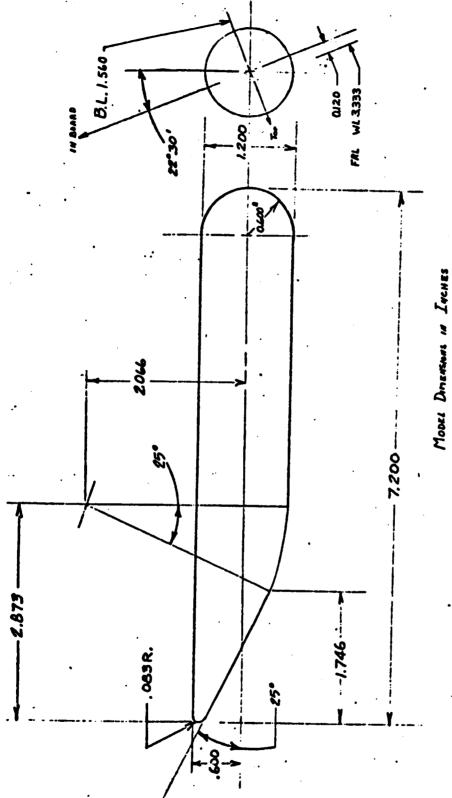


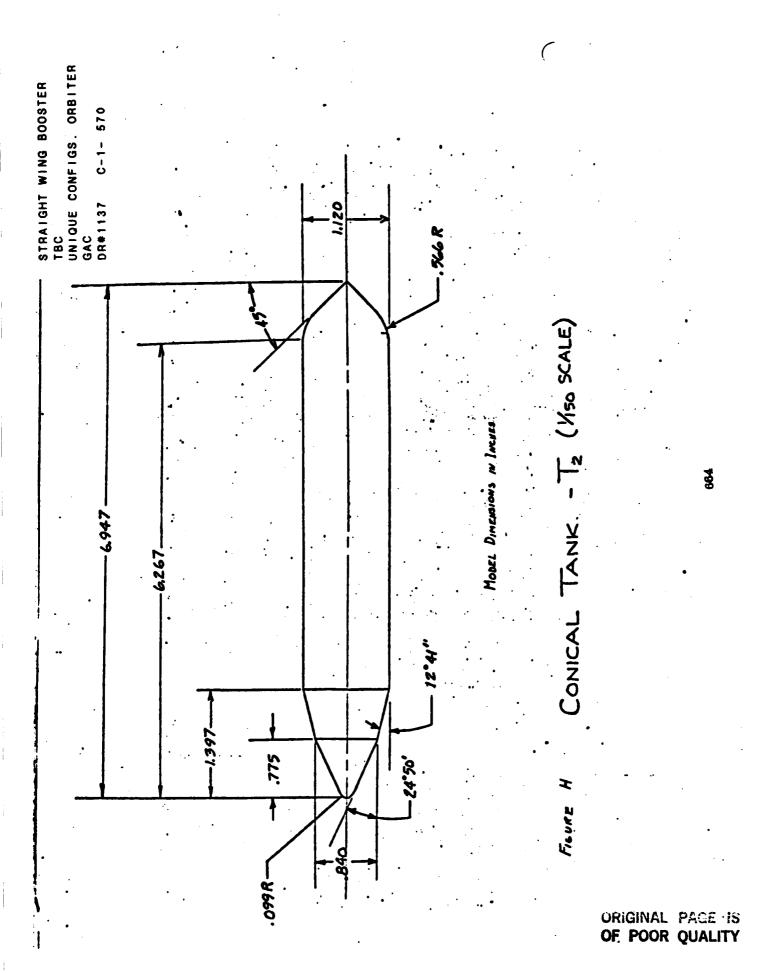
FIGURE F ORBITER AND BOOSTER BASE PRESSURE TAPS



CONTOURED NOSE TANK - T SCALE, LEFT TANK SHOWN, (7.50

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STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1137 C-1-569



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104

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BOOSTER

UNIQUE CONFIGS |IDPVAR(1)| IDPVAR(2)|NDV

LMSC

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MACH

DELTA BODY ORBITER

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LMSC DR#1085

UNIQUE CONFIGS. BOOSTER
LMSC
DELTA BODY ORBITER
LMSC
DR#1085 C-1- 572

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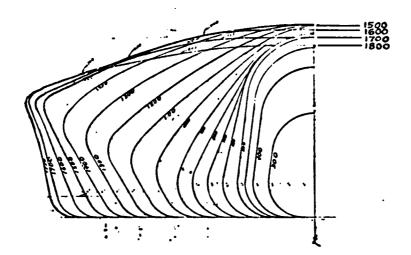
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Title

Model

Report No.

BODY STATIONS ARE IN INCHES FULL SCALE MODEL SCALE = 0.01



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FIGURE 2. BODY CONTOURS - CONFIGURATION BL

FIGURE 3. LAUNCH VEHICLE CONFIGURATION T2B4F16 THREE-VIEW.

UNIQUE CONFIGS. BOOSTER
LMSC
DELTA BODY ORBITER
- LMSC
DR#1085 C-1- 575

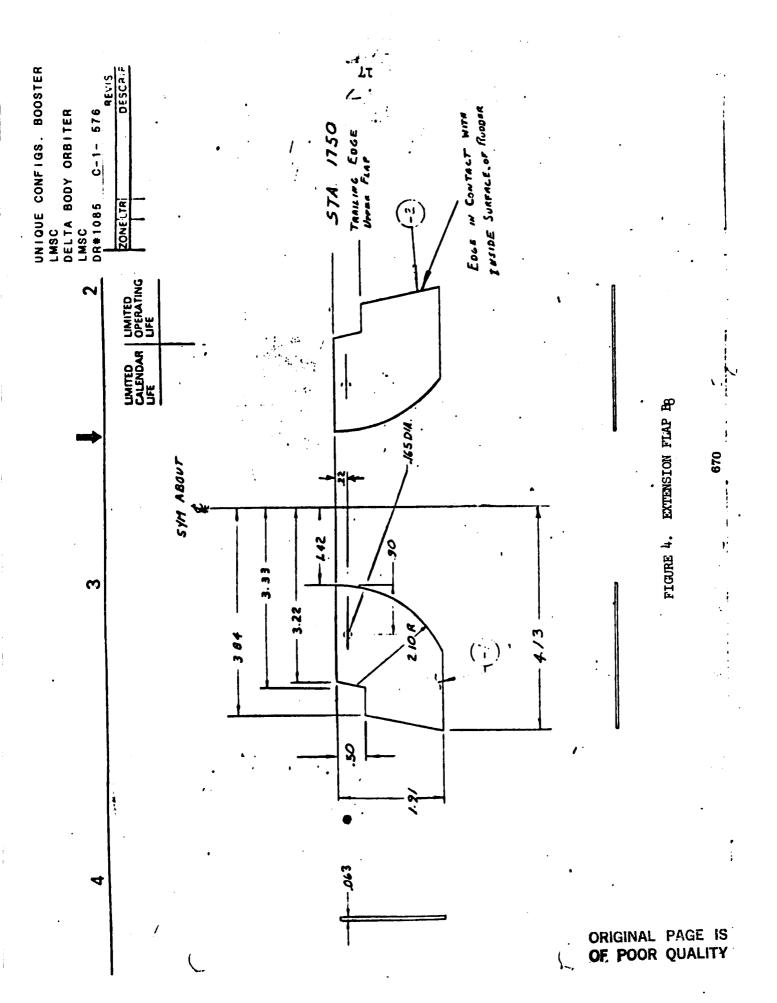


TABLE II.

TEST UPT 962 DATA SET/RUN NUMBER

COLLATION SUMMARY

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UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1197 C-1- 578

TABLE II. (CONTINUED)

TEST UPPT 962 DATA SET/RUN NUMBER

COLLATION SUMMARY

O PRETEST

TEST RUN NUMBERS NASA-MSFC-MAF -IDPVAR(1) IDPVAR(2) | 1277 D POSTTEST 62 9 4 MACH NUMBERS 1.5 1.9 2.16 103 105 106 111 118 124 125 98 100 211 011 901 115 117 3 1 o 116 123 109 122 101 119 102 114 8 120 107 121 37 NO, of RUNS BSTR. CONTROL DEFL. 672 -30, 2 del den 1c 2 20 ଥ 0 0 0 0 0 0 0 Ö 0 0 0 0 0 0 0 0 0 0 SCHD. 0 0 0 0 \$ æ Д Я В В æ м В В CONFIGURATION EMN1V1C BAN C COEFFICIENTS: BWN1 a or B SCHEDULES DATA SET RNWB 21 23 25 56 58 ?? } क्ष ₹ 27

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TABLE II. (Continued)	DATA SET/RUN NUMBER	COLLATION SUMMARY
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UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1197 C-1- 580

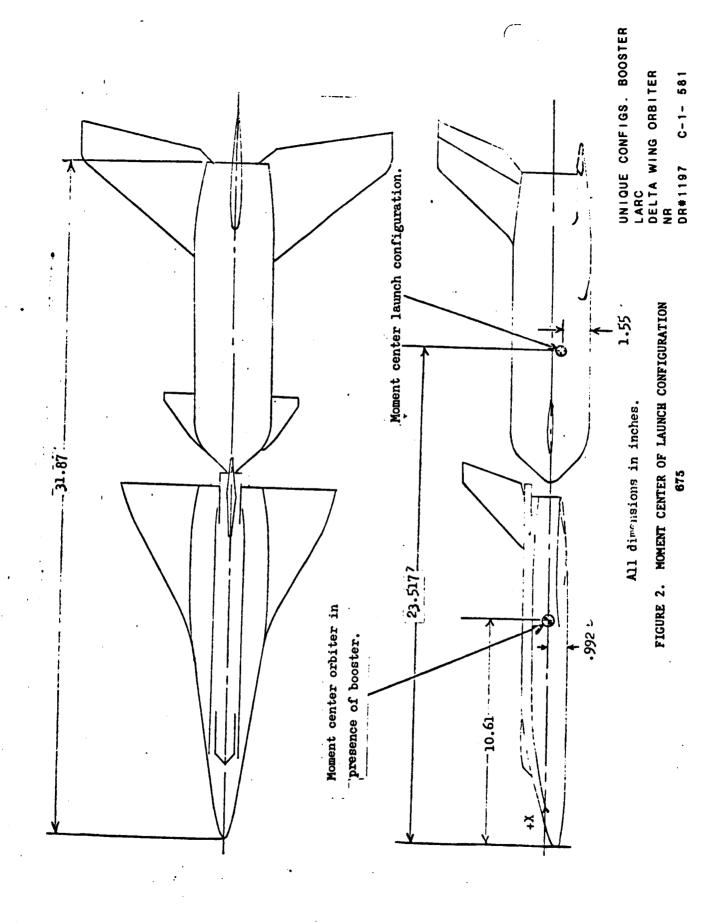
TABLE II. (CONTINUED)

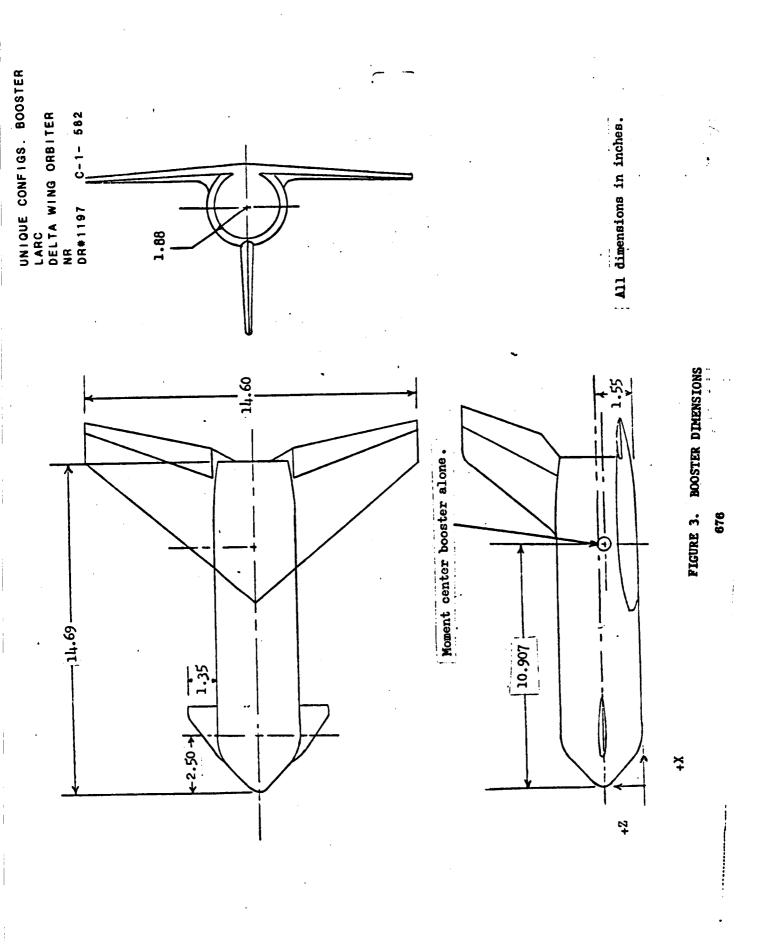
TEST UMT 962 DATA SET/RUN NUMBER

COLLATION SUMMARY

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UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1197 C-1All dimensions in inches.

FIGURE 4. ORBITER DIMENSIONS

2+

LARC DELTA WING ORBITER NR DR#1198 C-1- 584

OPRETEST

TEST CHT - 74 DATA SET/RUN NUMBER

COLLATION SUMMARY

TEST RUN NUMBERS NASA-MSFC-MAF –|IDPVAR(1)| IDPVAR(2)|NDV M POSTTEST 29 19 55 £ 9 MACH NUMBERS 8 -2, 0, 2, 5, 10, 15, 20, 25, 1023 15 23 7. # 12 16 œ 9 2 17 9 2 22 ₹ 큐 35 A - ALPHA - 20, 25, 30, 35, 40, 45, 50, 55, 60 MO. of RUNS B CONTROL DEFLECTION 35, 40, 45, 50, 55, æ • 0 0 ၁ Ģ -30 -30 -75 ဖွ d 3 0 ð -15 -30 7 0 B - ALPHA - 25, 30, 35, C - ALPHA - -11, -8, -4, SCHD. 0 4 ç 0 5 5 -5 ځ 0 싞 0 0 0 0 0 4 0 0 5 C ပ BCWV (Rudder Off) CONFIGURATION BCAV M COEFFICIENTS: 孟 Д a or B SCHEDULES DATA SET IDENTIFIER ષ્ઠ 8 8 8 10 8 03 る Б 12 13 15 91 11 18 19 8 RMYB OL Ħ

678

of 'blow Gavita'

TEST CHIT - 74 DATA SET/RUN NUMBER COLLATION SUMMARY

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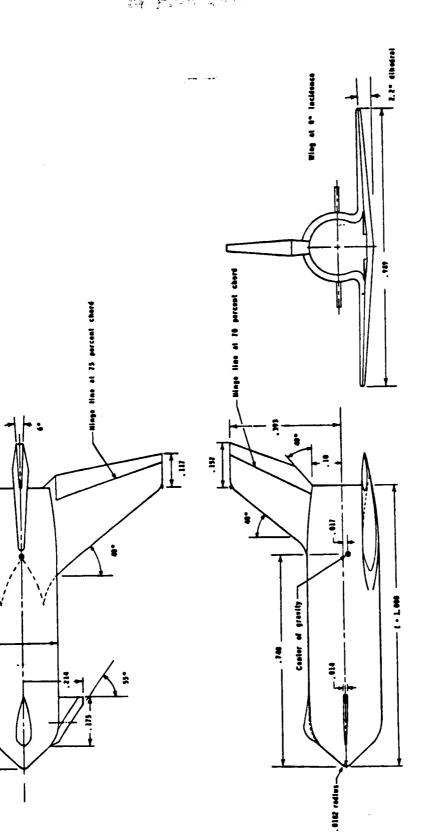
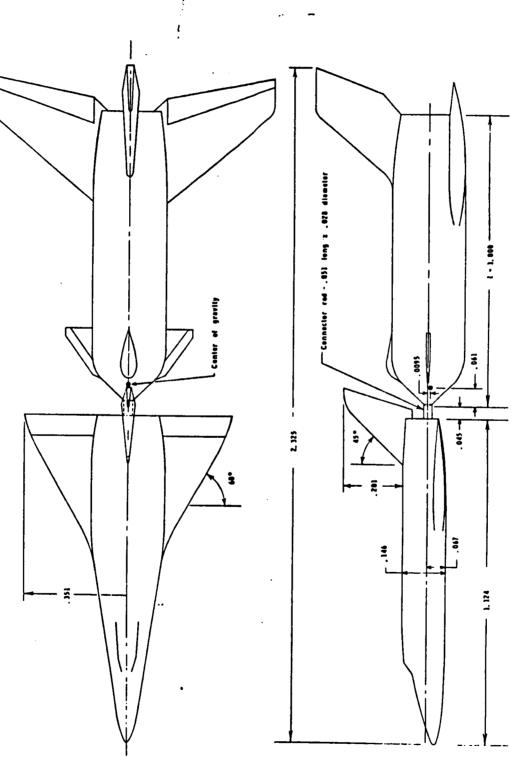


Figure 2. Booster model. All dimensions in percent of fuselage length (8.90-inch)



Pigure 3. Ascent configuration. All dimensions in percent of booster fuselage length (8.90-inch) UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
081
DR#1198 C-1-587

MANY SECTION

DELTA WING ORBITER NR

DR#1200 C-1- 588

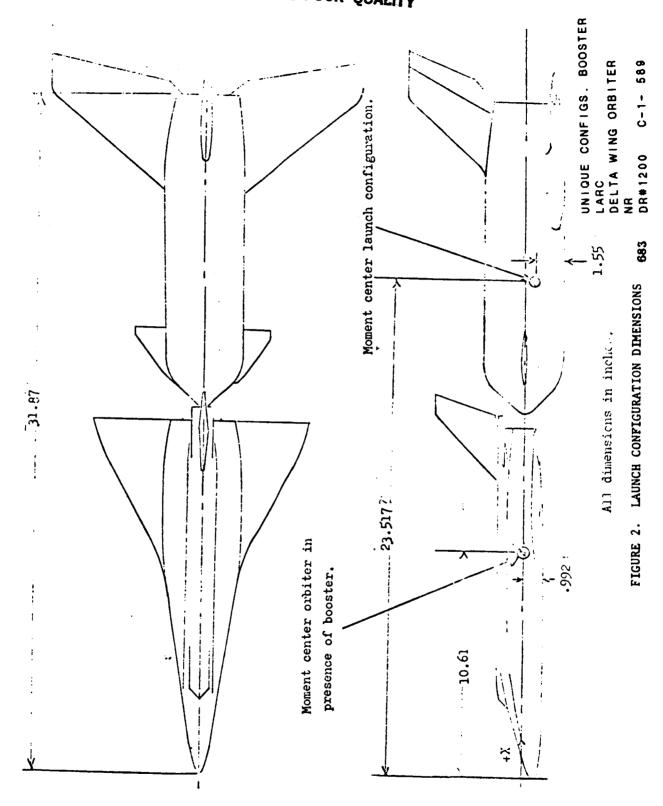
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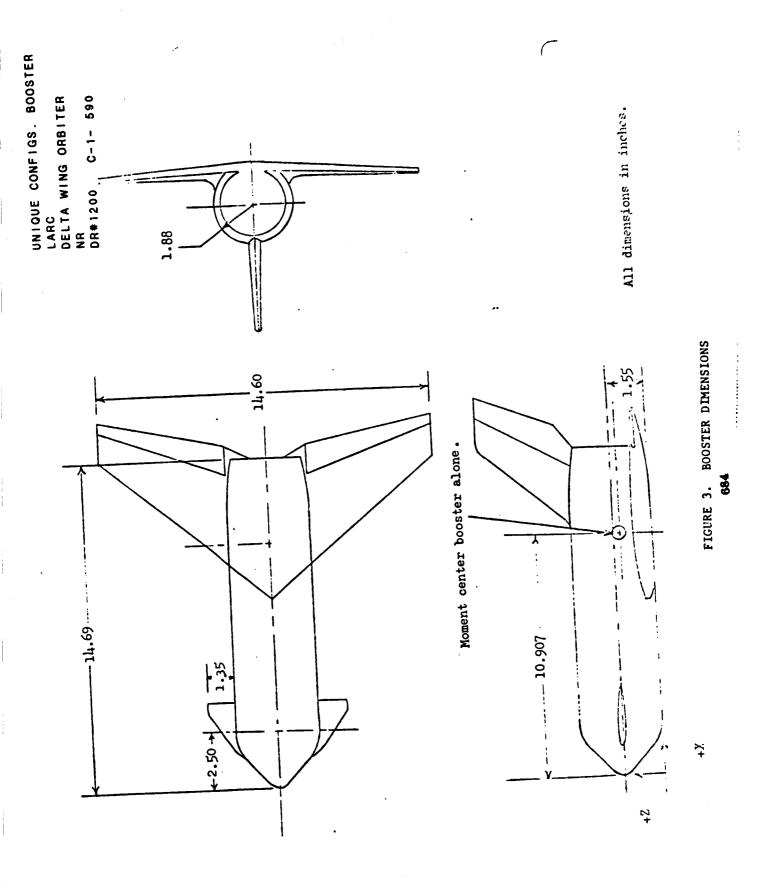
DATA SET/RUN NUMBER TEST 8' 177 605

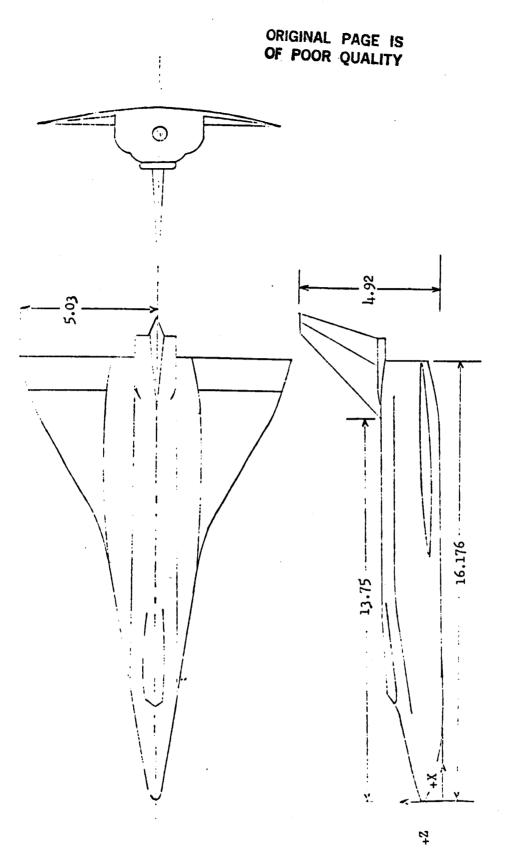
TABLE II.

COLLATION SUMMARY

TEST RUN NUMBERS HASA-MSFC-MAF LIDPVAR(1) IDPVAR(2) INDV - POSTTEST OR ALTERNATE INDEPENDENT VARIABLE) 6 9 55 0.9 1.0 1.2 91 4 12 28 19 31 æ 8 8 82 2 49 1,2 747 25 8 57 ĸ 12 న్ 75 22 ೩ 8 MACH NUMBERS 43 84 53 63 8 8 ಜ 92 8 23 ç 0.4 0.6 77 5 ₹ 92 Ż 5 8 24 -1, 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 ₹ 5. 8 ₽ 20 55 9 40 **£**2 65 15 85 35 10 25 27 27 37 of RUNS S BETR. CONTROL DEFL. NO. CA A -8, -6, -4, -2, 0, 2, 4, 6, 8 0 2 ö 0 0 0 0 9e -10 0 2 0 0 0 9 SCHD. 0 0 0 0 0 0 0 0 0 0 6 æ 4 B4W16V24(Orbiter Alon BμW16V24(Pres. Booster)  $B_{\mu}^{\text{M}}16^{\text{V}}2^{\text{M}}$  (Pres. Booster) BWN1V1C + BUW16V24  $BW_1V_1 + B\mu W_16V_2\mu$ BMN1V1C+B4W16V24 CONFIGURATION Schedule g Ø BWN 1V1C BWIN V BWN1V1 COEFFICIENTS: a or b SCHEDULES DENTIFIER DATA SET ರ ð 6 8 8 9 8 5 02 03 9 8 93 す 킹 RMZ0 01 S 6 RMZB RMZL







UNIQUE CONFIGS. BOOSTER LARC DELTA WING ORBITER NR DR#1200 C-1- 591

All dimensions in inches.

FIGURE 4. ORBITER DIMENSIONS

UNIQUE CONFIGS. BOOSTER TBC DELTA WING ORBITER NR DR#1055 C-1-592

TEST MSEC TWT476 DATA SET COLLATION SHEET

RZSOZ1 BF1S + BSW1. RZSO21 RZSO41	CONFIGURATION	SCHU.	CONTROL DEFLECTION	EFLECTION	0				MACH:	HINBERS					
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NOTE: ALL DIMENSIONS ALE MODEL SCALE (INCHES)

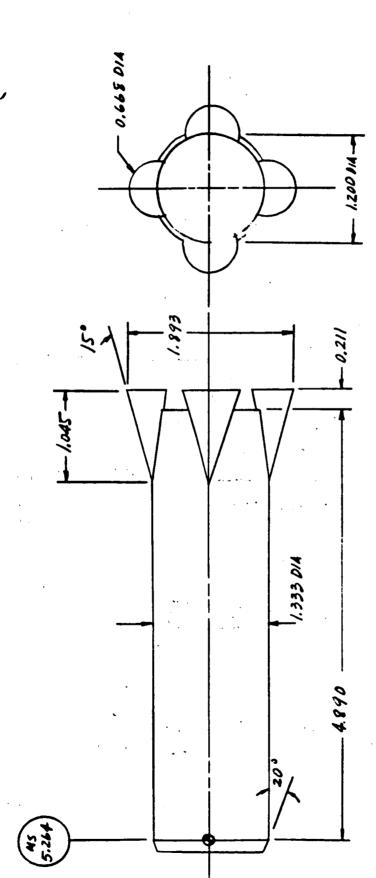
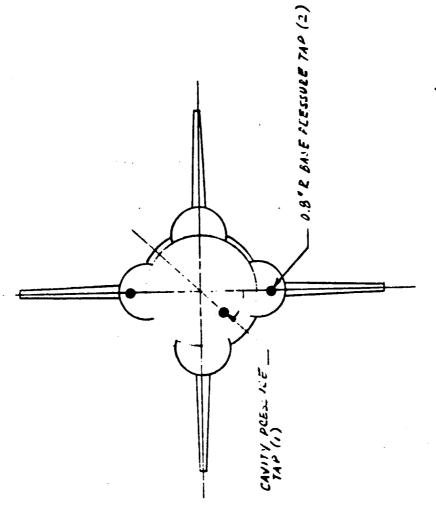


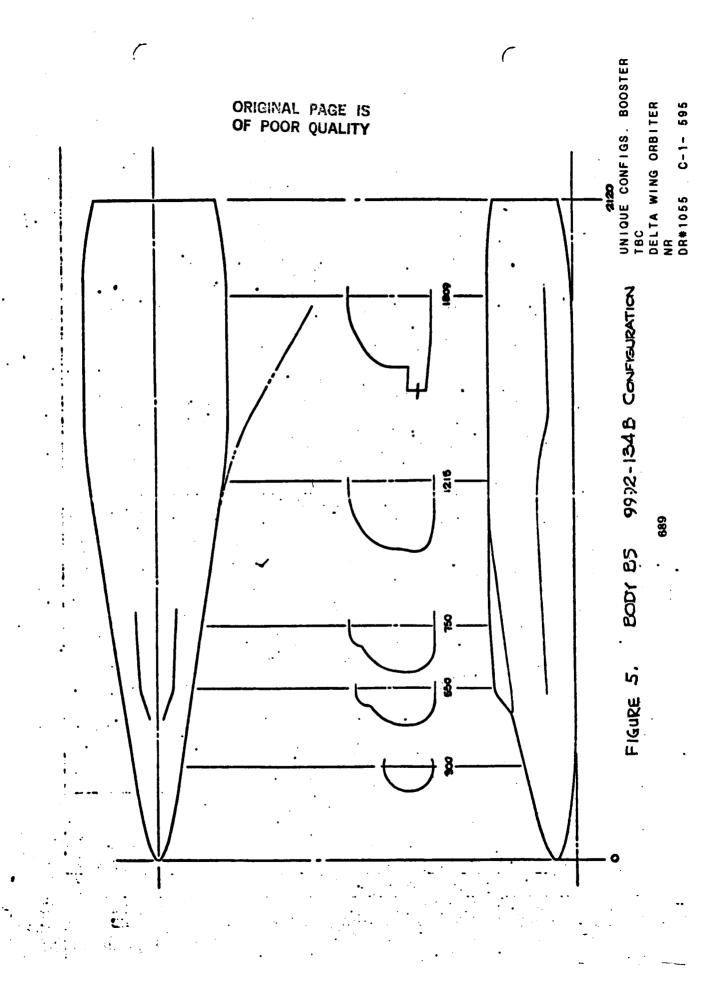
FIGURE 9. SATURNY/SIC BOOSTER

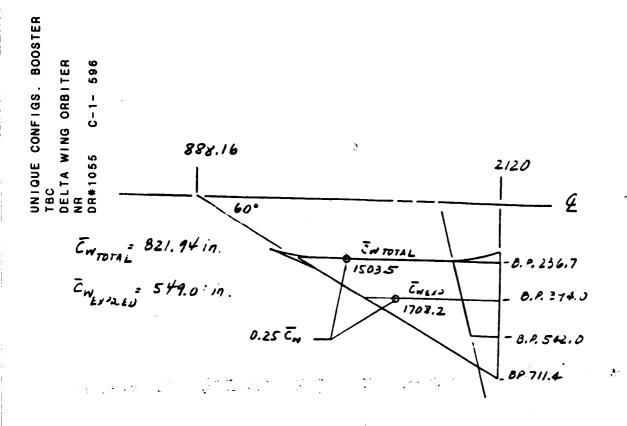
UNIQUE CONFIGS. BOOSTER TBC DELTA WING ORBITER NR DR#1055 C-1- 593



TYPICAL BASE PEESSURE LOCALIDAS

FIGURE 3.





CHORD (B.P. 240.0)
0009-64 SELIES AIRFOIL

TIP CHOED (B.P. 542.3)
-5° 0012-64 SELIES AIRFOIL

NOTE: ALL DIMENSIONS ARE
FULL SCALE (INCHE)

FIGURE 6. WING WIA 9992-1348 CONFIGURATION COMPLETE DELTA- NO CLIPPE, TIP

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NOTE : ALL GIMENSION. ALE FULL SCALE (INCHES)

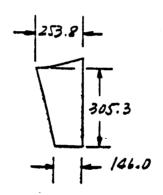


FIGURE 7. ELEVON E3 - ELEVON USED WITH WING WIA

## NOTE · ALL DIMENSIONS ARE FULL SCALE (INCHES)

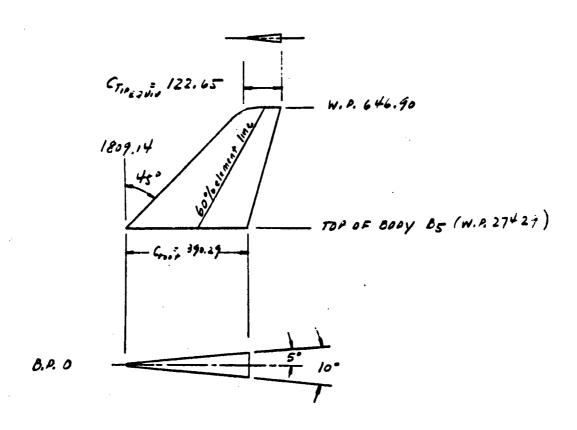
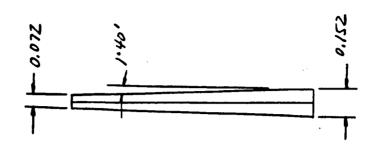


FIGURE 8. VERTICAL STABILIZER VIT



UNIQUE CONFIGS. BOOSTER TBC DELTA WING ORBITER NR DR#1055 C-1- 599

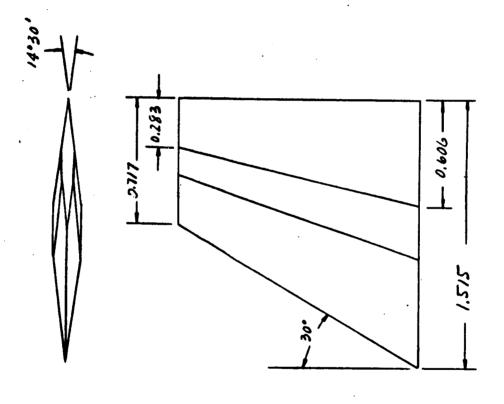


FIGURE 10. 900 FT2 S.IC FIN

SHEET	
COLLATION	
DATA SET	
TWT 485	
TEST	

SHEET 1 of 2

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DELTA WING ORBITER NR

C-1- 602

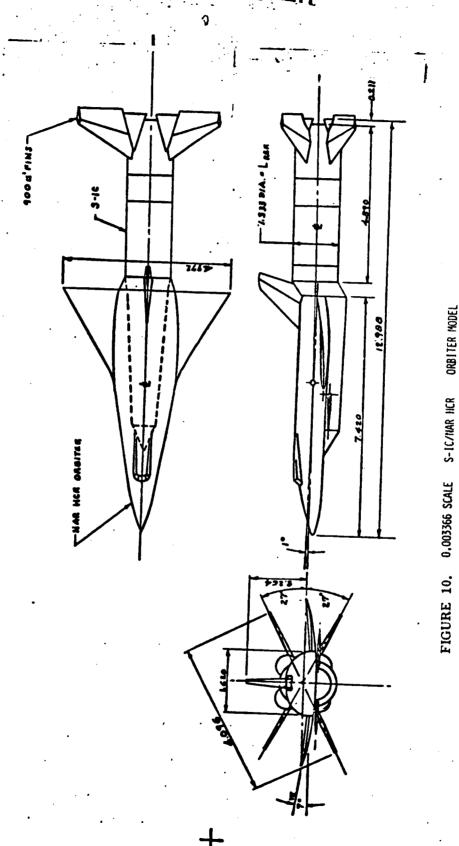
DR#1091

TEST TWI #485 DATA SET COLLATION SHEET

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NASA-MSFC-MAP LIDPVAR(1) IDPVAR(2) NDV CAF CAB Ø 2 2 CPC 787 x+8E=0.+16 C, IC Y M CLM ICK COEFFICIENTS: SCHEDULES a or B

DRAWING NOT TO SCALE



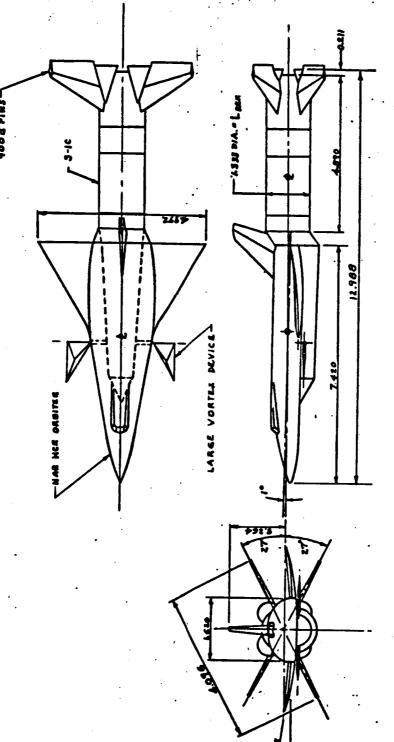


FIGURE 12. S-IC/NAR HCR ORBITER WITH VORTEX DEVICE, 0.003366 SCALE MODEL

DRAWING NOT TO SCALE

UNIQUE CONFIGS. BOOSTER TBC DELTA WING ORBITER NR DR#1091 C-1- 605

, 669

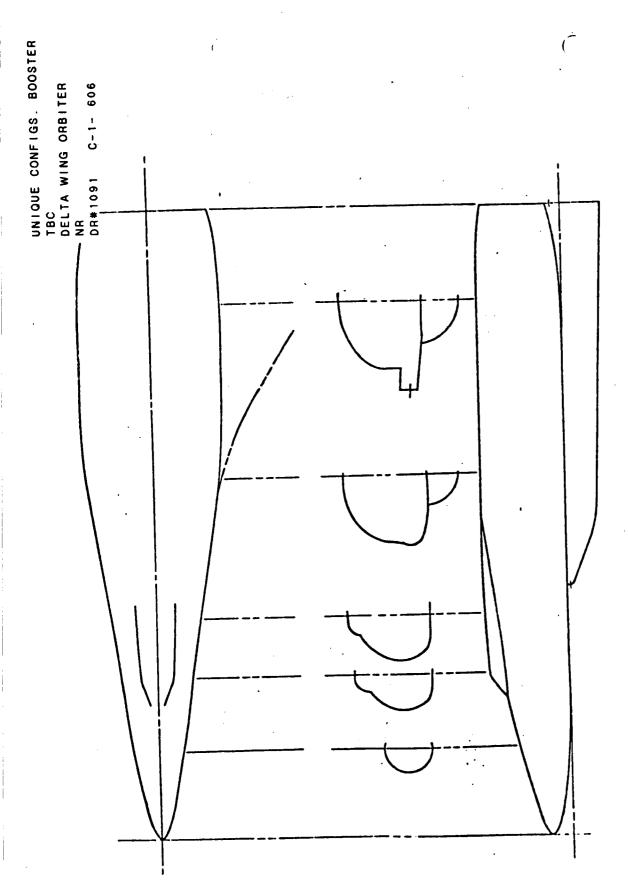
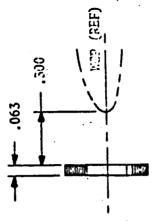
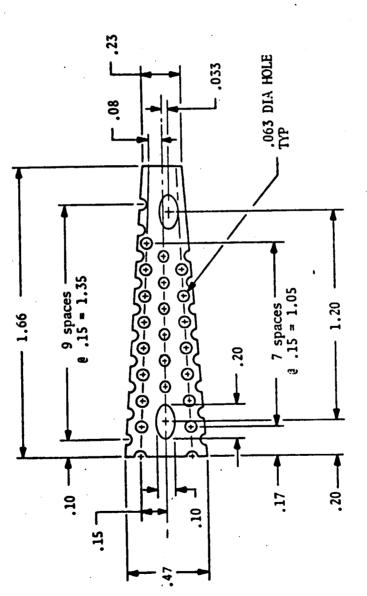
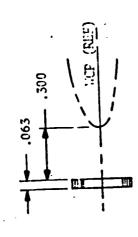


FIGURE 13. NAR HCR ORBITER BODY WITH CRANLE





LARGE SPOILER - S1 FIGURE 14.

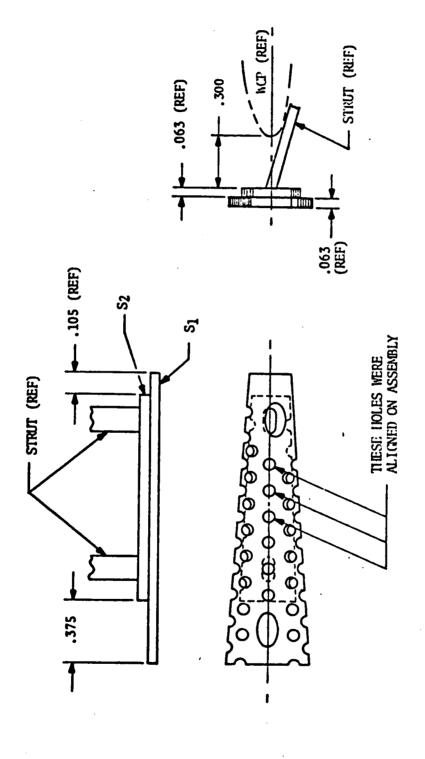


6 spaces 6 15 = .90

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SNALL SPOILER - S2 FIGURE 15.

,063 DIA HOLE INP



5-

FIGURE 16. SPOILER S<sub>3</sub> (MODIFIED S<sub>1</sub>/S<sub>2</sub>)

UNIQUE CONFIGS. BOOSTER TBC DELTA WING ORBITER NR DR#1091 C-1- 609

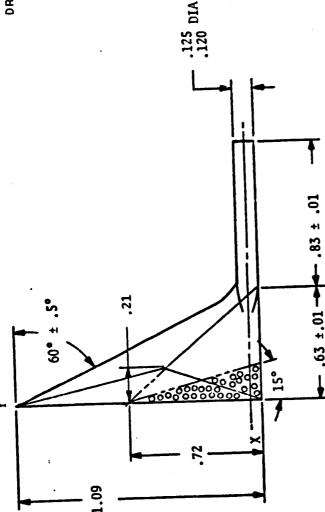
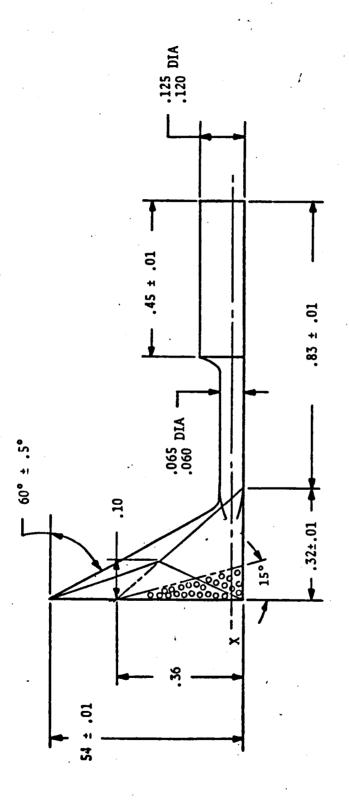




FIGURE 17. LARGE VORTEX DEVICE - VD1



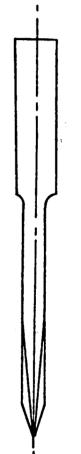


FIGURE 18. SMALL VORTEX DEVICE - VD2

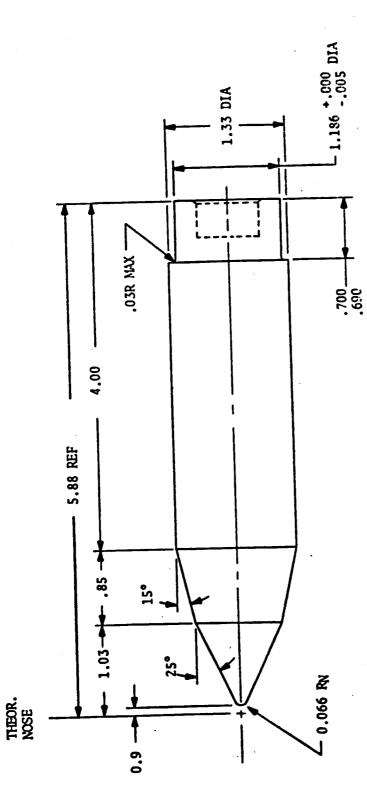
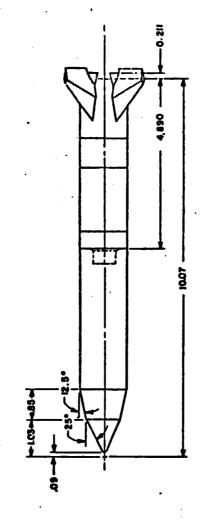
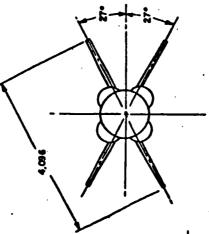
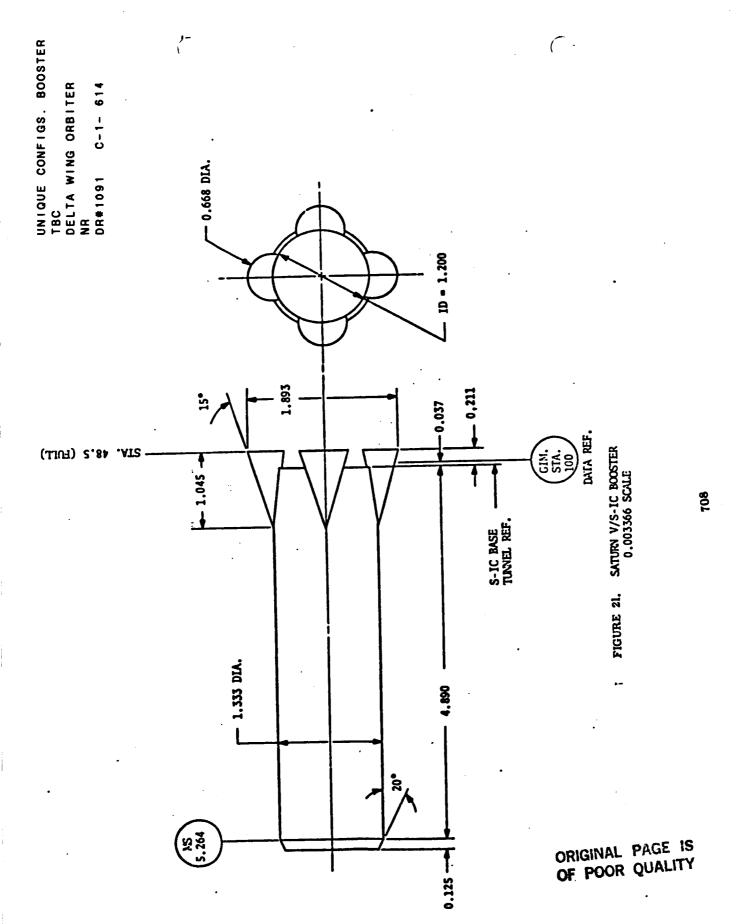


FIGURE 19. MLY CONE FRUSTUM CYLINDER FOREBOUY - G









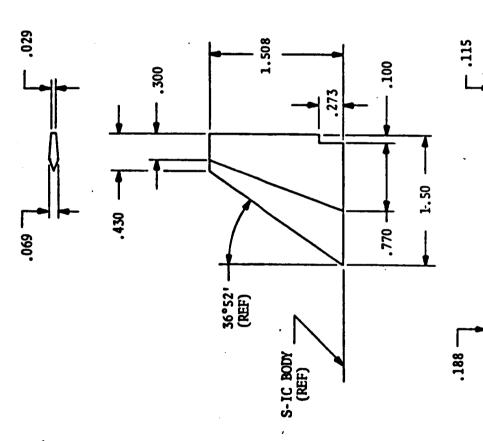
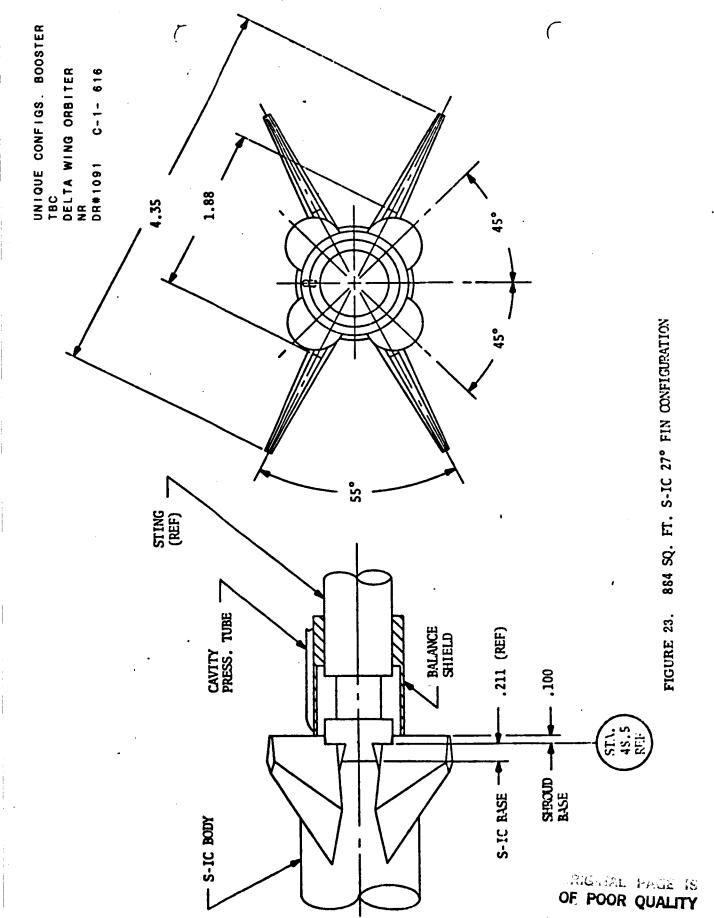
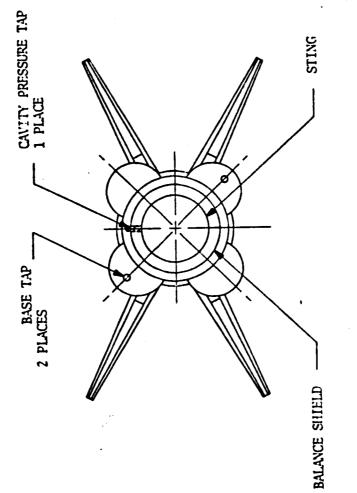


FIGURE 22. 884 SQ. FT. S-IC FIN



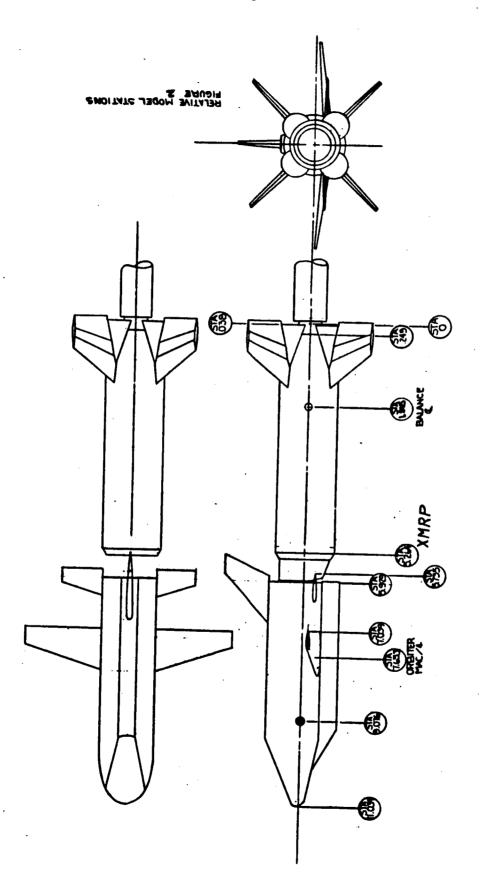


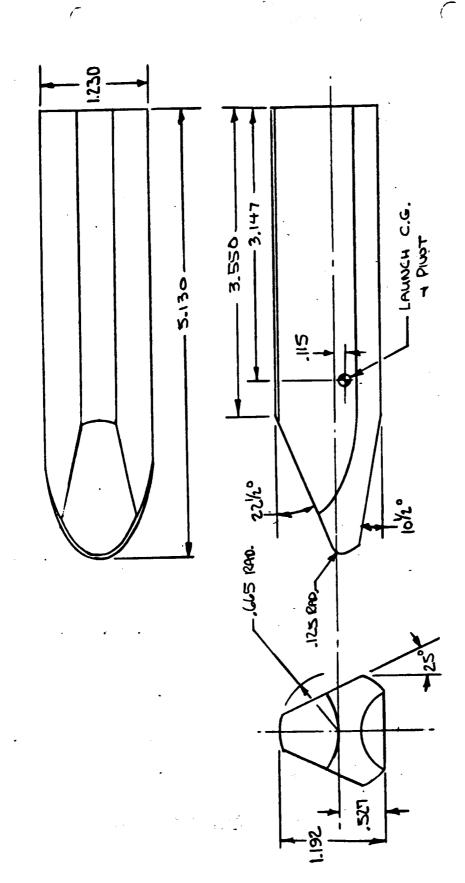
BASE PRESSURE TAP LOCATIONS FIGURE 24.

UNIQUE CONFIGS. BOOSTER	TBC	STRAIGHT WING ORBITER	GAC	DR#1044 C-1- 618	M POSTTEST
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	SET				
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	TEST				

BE OWHVS	TYPE VIVE		SCHD.	<u> </u>	PARAMETERS/VALORED				100	100.10			7			PAGE MONDERO ON ALLEMANTE TRANSPORTED		
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BE_DWHVS			4	·		-1	-		5	1		7	9					
BOWHVS	110772	BE OWHVS	0	0			7	_	200%	-	20/20	200	%	%				
BCOWHYS	100Thc		Ψ	C			7	%20	32%	1/20	2:2/0	240	10/2	<i>?</i> ?	_			
BCWHVS	12002		ر	?			7	620	3	980	03%	03/20	34%	13%				
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BE_OWHVS	24051	SVEINCE		C			1	£40	9440	12/2	20	1/2/2	170	70				
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BE, OWHVS	וויטעי			7-	_			1 057	1850	1	300	0//90		163				
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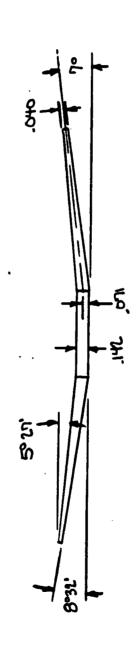
a or B SCHEDULES





ORBITER BODY - 0 FIGURE 3





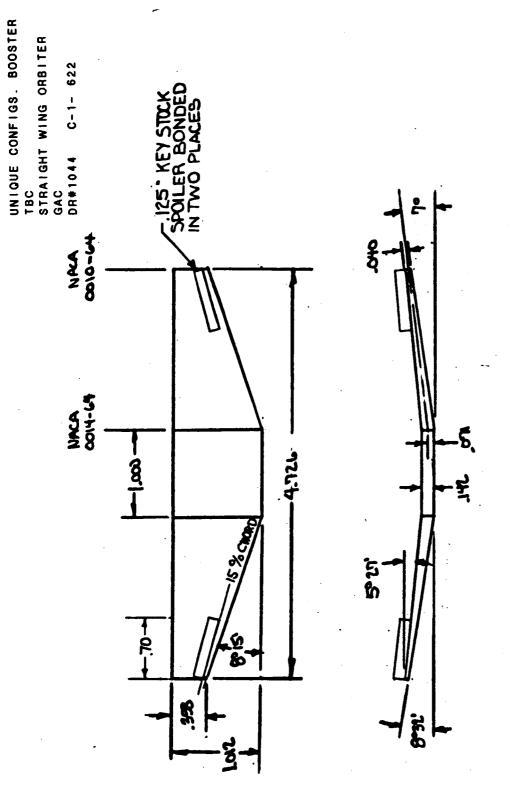
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NPCA 00/00-64

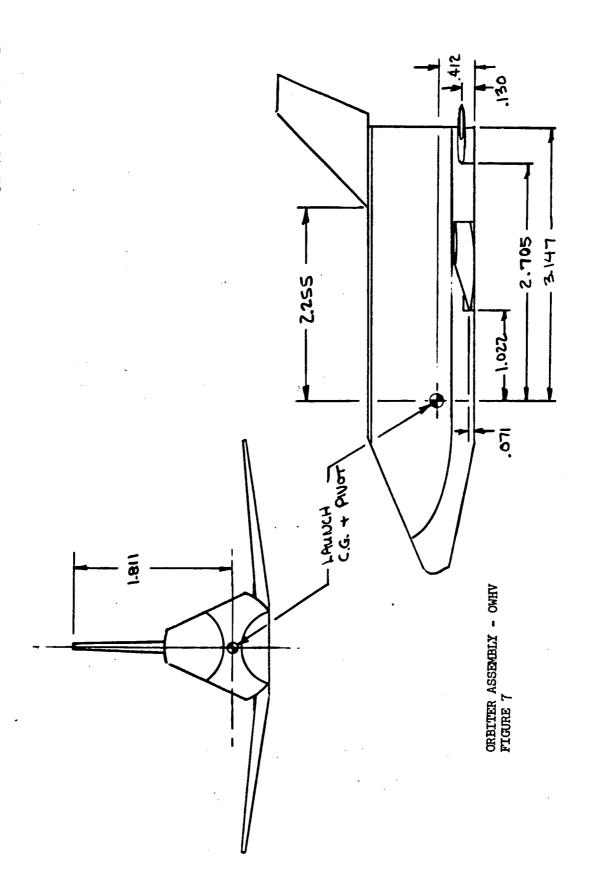
NACA COI4-64

ORBITER WING - W FIGURE 4



orbiter wing with spoilers  $\mathbf{w}_1$  figure 5

ORBITER HORIZONTAL TAIL H, VERTICAL TAIL - V FIGURE 6 UNIQUE CONFIGS. BOOSTER TBC STRAIGHT WING ORBITER GAC DR#1044 C-1- 623



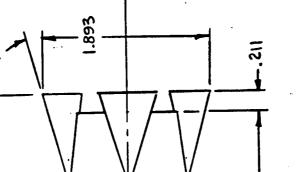
UNIQUE CONFIGS. BOOSTER TBC STRAIGHT WING ORBITER GAC DR#1044 C-1- 625

c fin

900 FT<sup>2</sup> S-IC FIN

-.668 DIA.

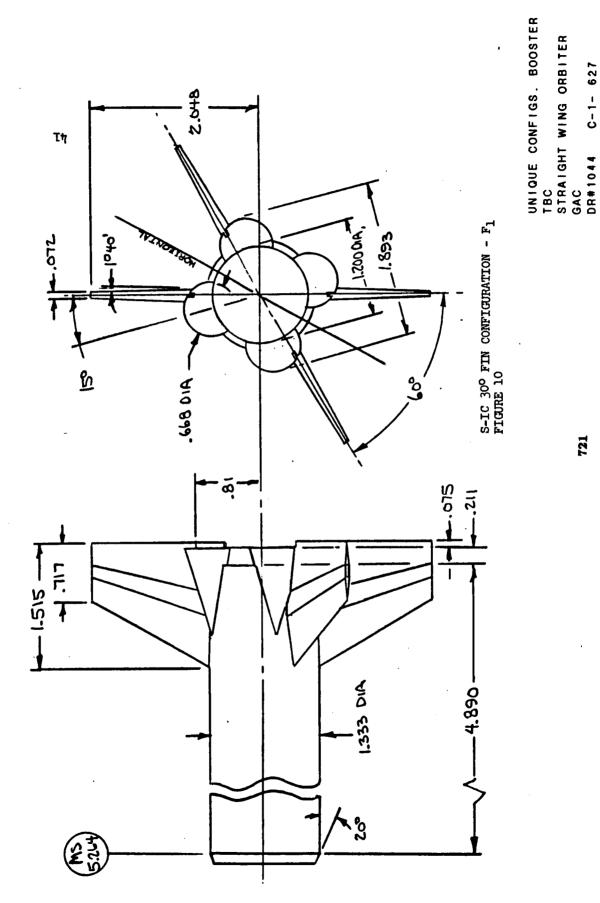
+ SHO:1-1

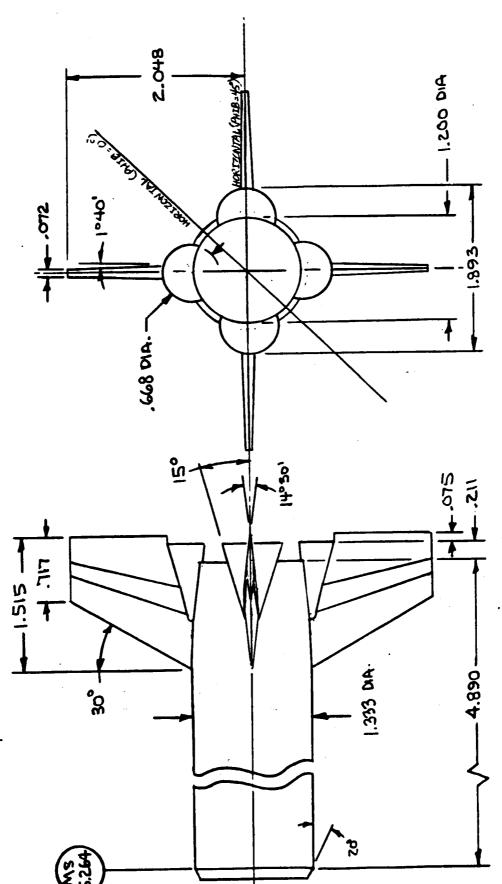


1.333 DIA.

S-IC BODY - B FIGURE 9

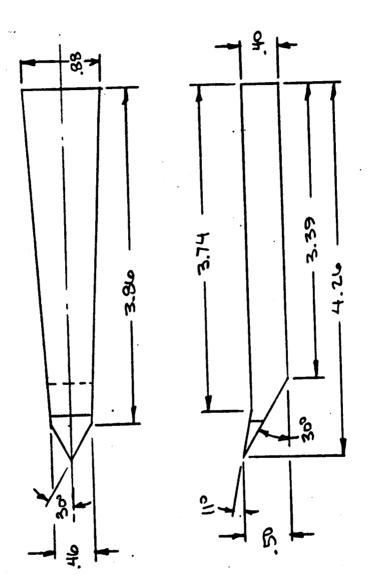
-1.200 MA-





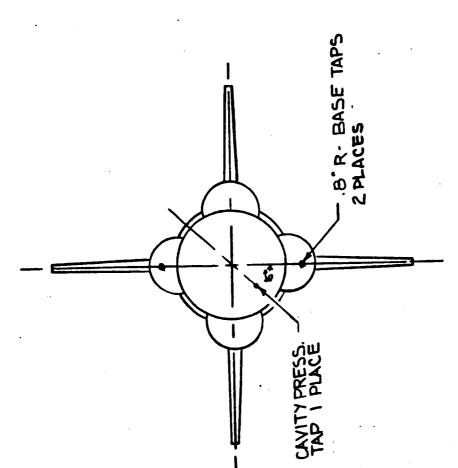
s-ic  $45^{\circ}$  fin configuration -  $F_2$  figure 11

(



STRONGBACK - S FIGURE 12

UNIQUE CONFIGS. BOOSTER TBC STRAIGHT WING ORBITER GAC DR#1044 C-1- 629



BASE PRESSURE TAP LOCATIONS FIGURE 13

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Q 109 110 111 112 113 110 111
001 88
30 LU
CONFIGURATION SCHD. PARAMETERS/VALUES NO. MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLES)

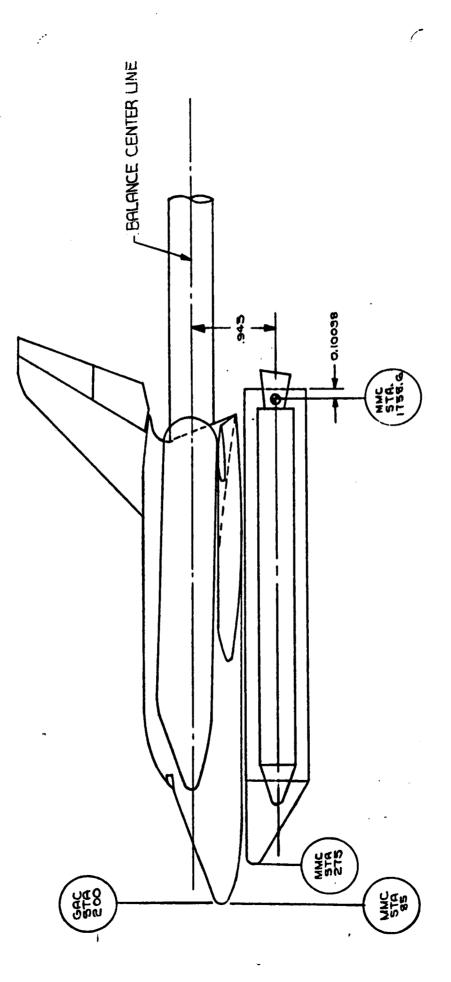
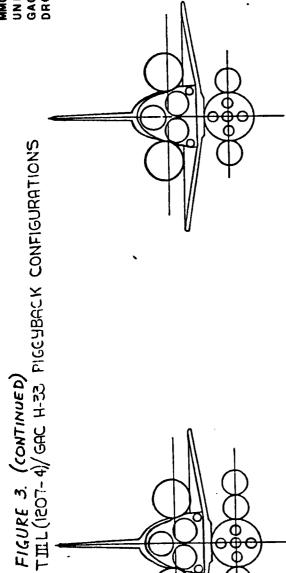
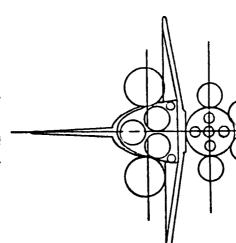


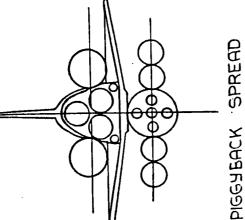
FIGURE 3. TILL (1207-4)/GAC H-33 PIGGYBACK SPREAD CONFIGURATION



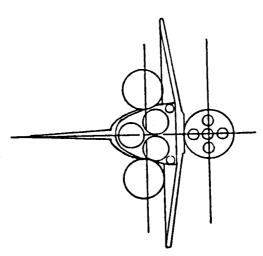
PIGGYBACK SPREAD



PIGGYBACK CLUSTER



PIGGYBACK SPREAD



PIGGYBACK C, + 0,

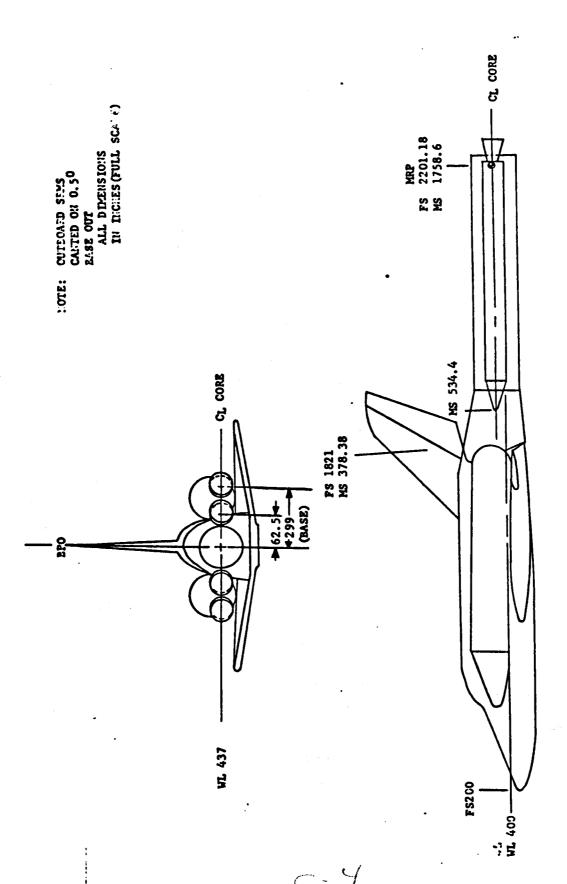


FIGURE 4. TIIL (1207-4)/CAC H-33 (SPREAD) TANDEM CONFIGURATION

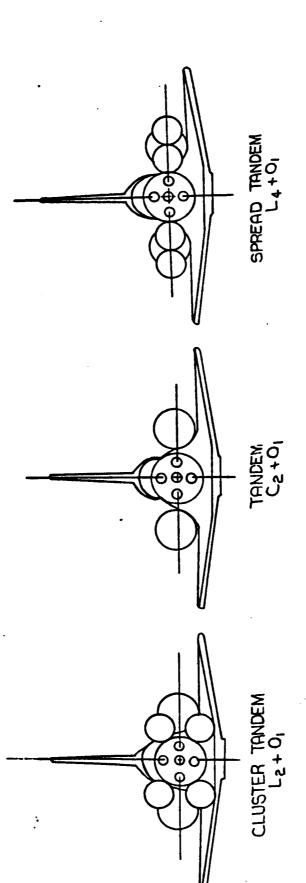


FIGURE 4. (con't) TIIL (1207-4)/GRC H33 TANDEM CONFIGURATIONS

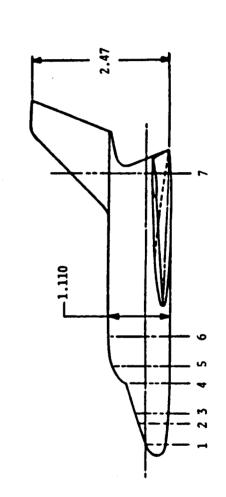


FIGURE 5. H-33 ORBITER (3-VIEW)

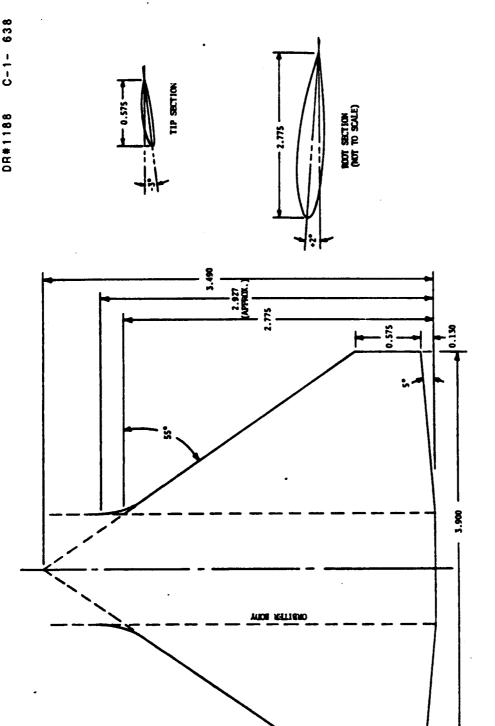


FIGURE 6. GRIMMAN H-33 ORBITER WING 0.003366 SCALE

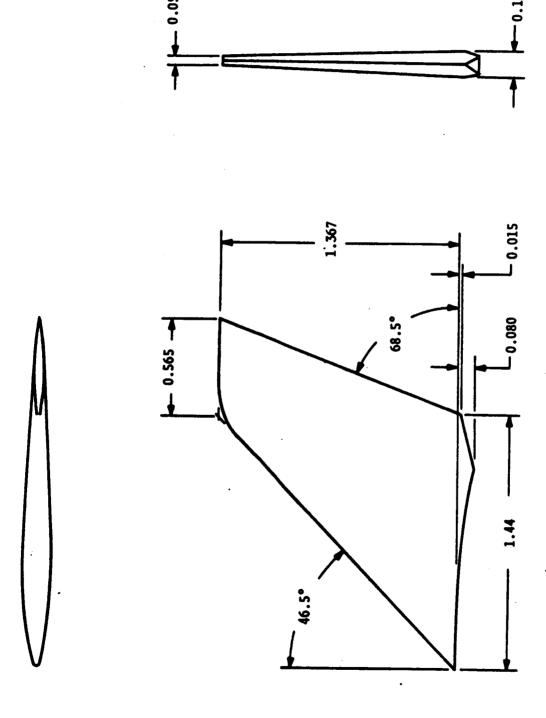
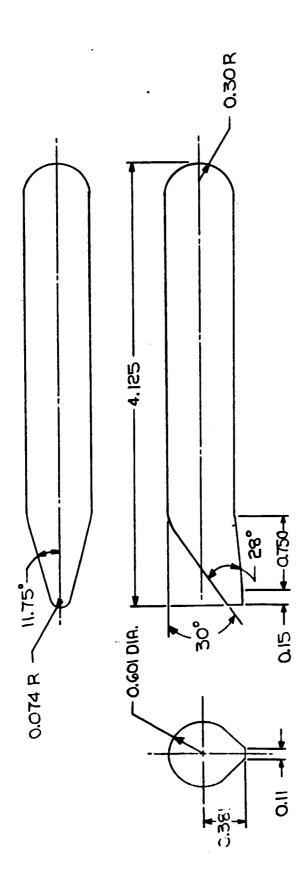
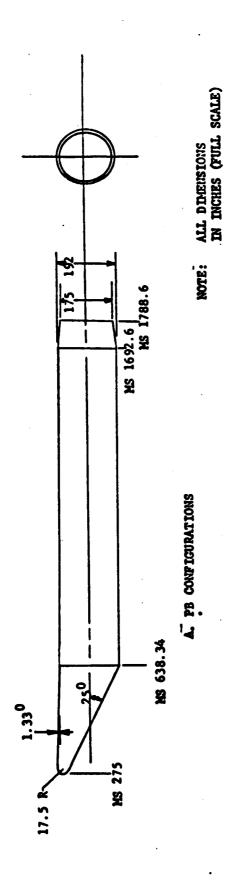


FIGURE 7. GRUMMAN H-33 ORBITER VERTICAL TAIL 0.003366 SCALE UNI



GRUMMAN H-33 ORBITER EXTERNALLY MOUNTED DROP TANK FIGURE 8.



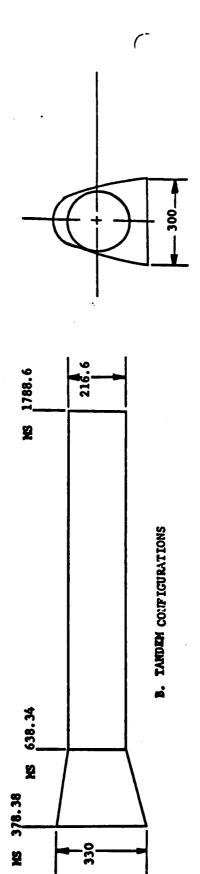
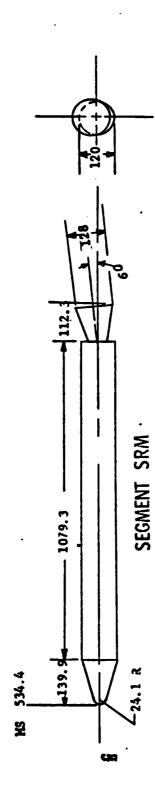


FIGURE 9. TIIIL CORE



NOTE: ALL DIMENSIONS IN INCHES (FULL SCALE)

FIGURE 10. TIIIL SOLID ROCKET MOTOR (SRM)

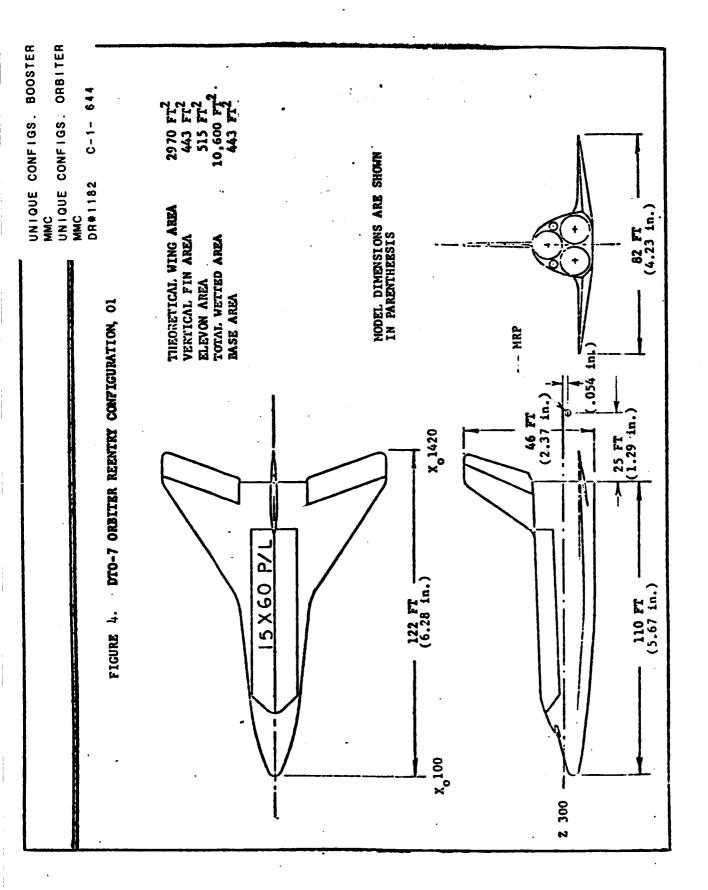
O PRETEST

TEST MISEC TUIT # 505 DATA SET COLLATION SHEET

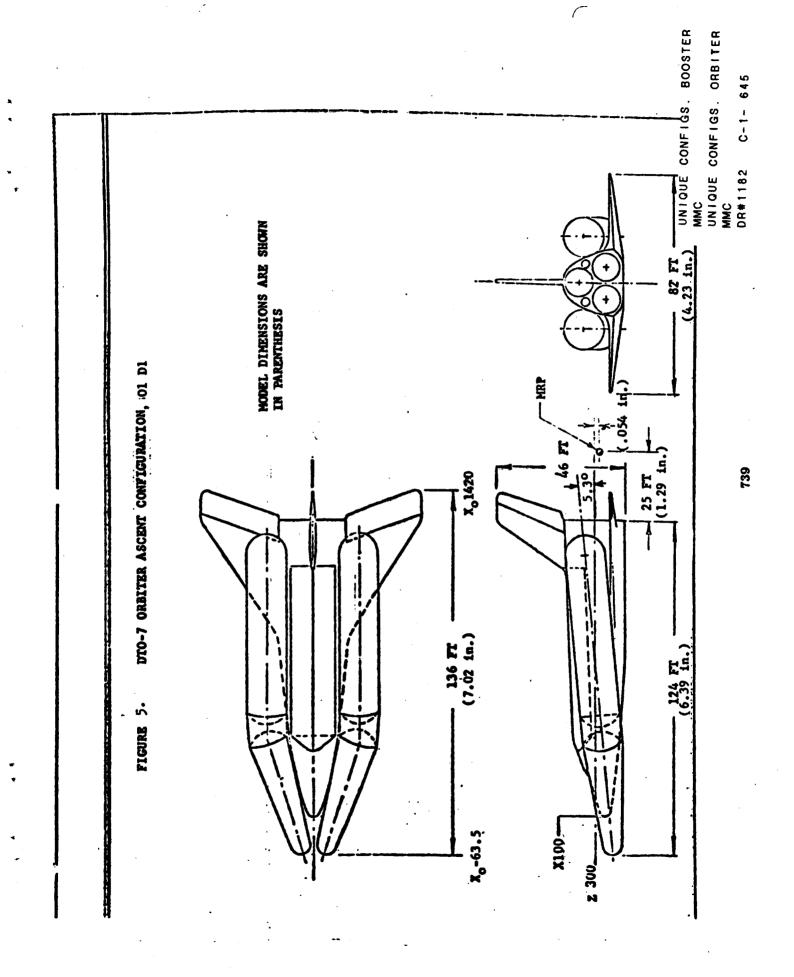
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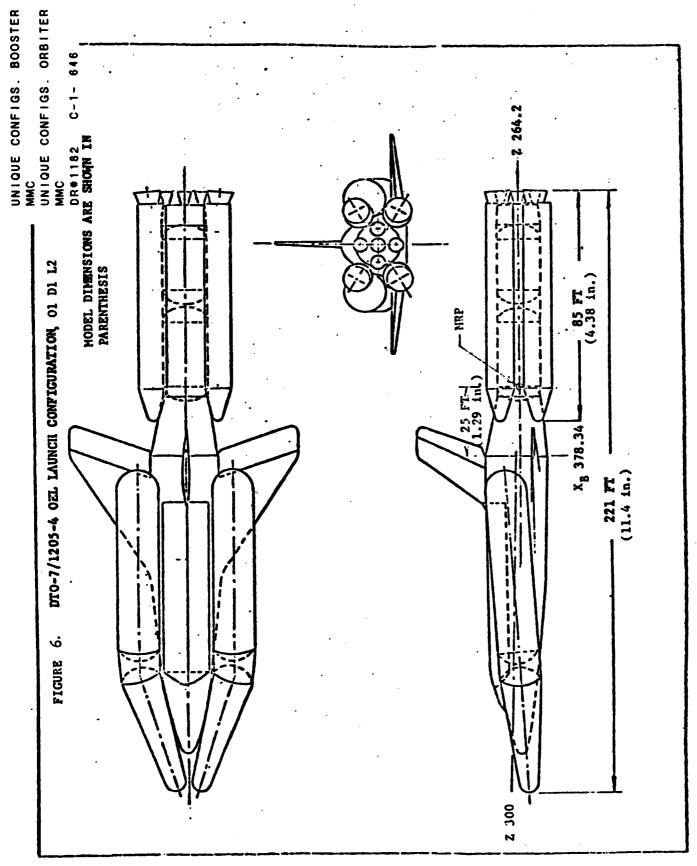
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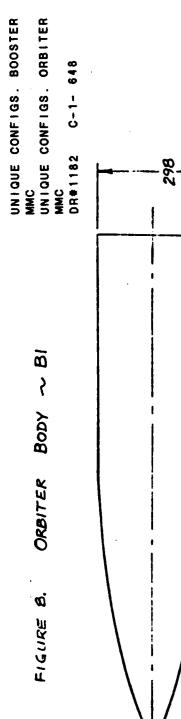
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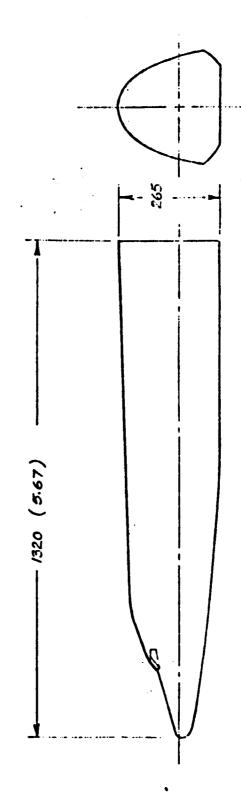


UNIQUE CONFIGS. BOOSTER MMC UNIQUE CONFIGS. ORBITER MMC DR#1182 C-1- 647 362 MODEL DIMENSIONS ARE SHOWN IN PARENTHESIS CONFIGURATION, OIDEL4 -111.0 FT - MRP X 678.39 + 25 FT. -- (1.29 M) -245 FT (12.63 M.) TEL LAUNCH - Z48 DTO-7/1207-4 FT - 112.5 ₹300

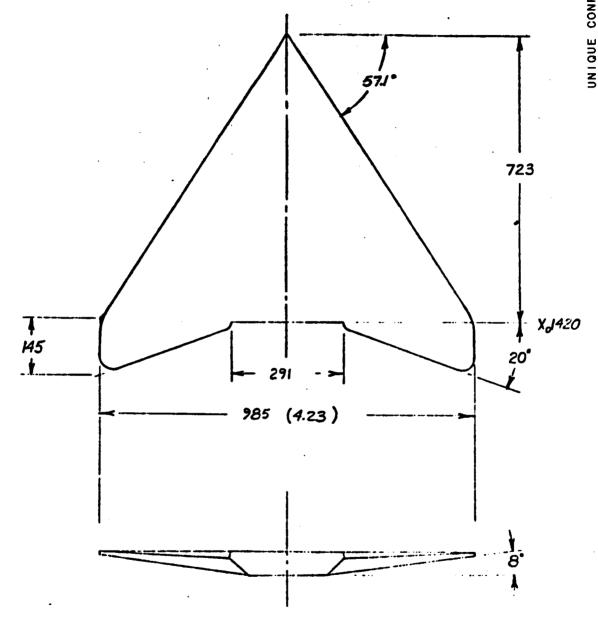
Figure 7.



NOTES 1. ALL DIMENSIONS ARE M INCHES. 2. MODEL VALUES ARE SHOWN IN PARENTHESIS.

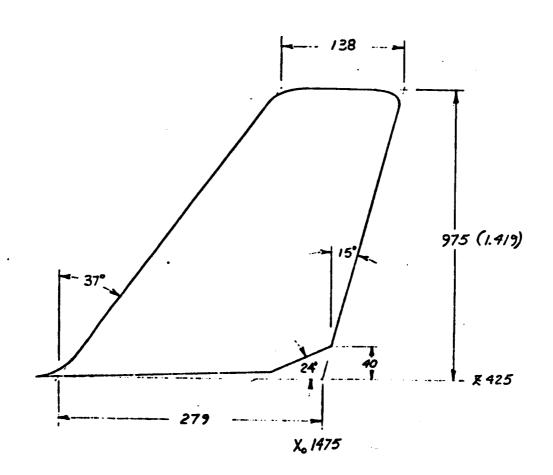


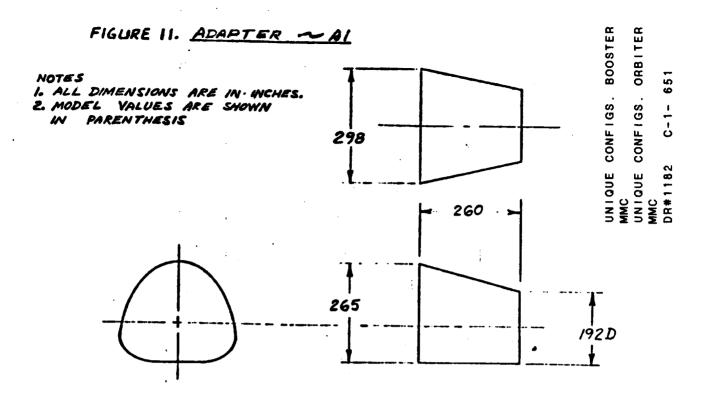


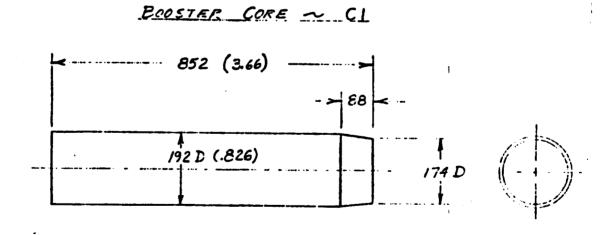


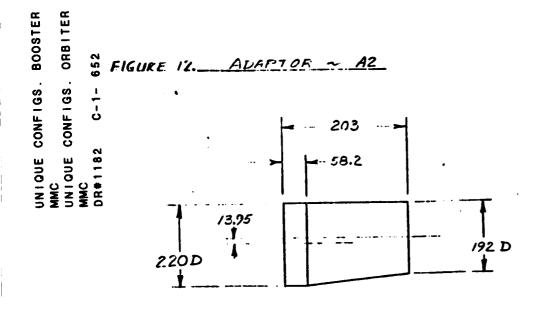
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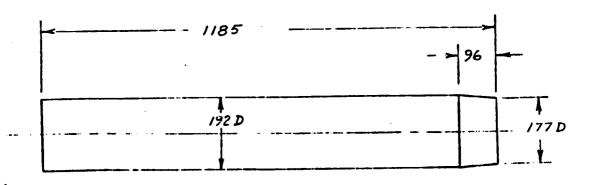






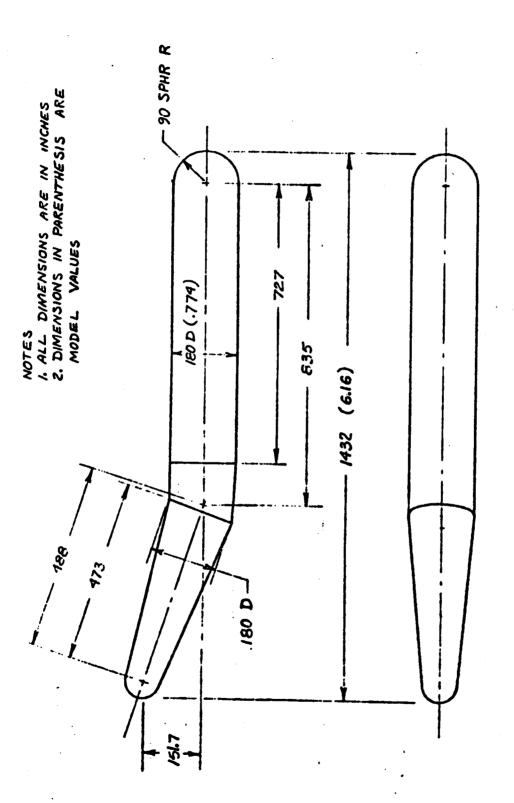
ALL DIMENSION ARE FOR FULL SCALE IN INCHES

## BOOSTER CORE ~ CZ



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FIGURE 13, DROP TANK ~DI

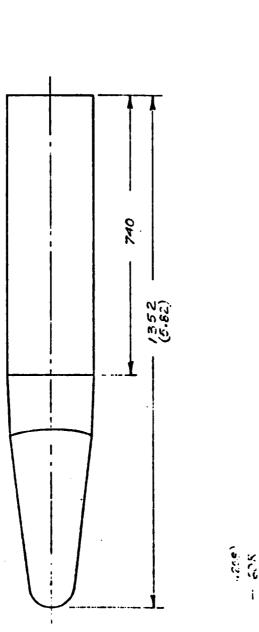


UNIQUE CONFIGS. BOOSTER MMC UNIQUE CONFIGS. ORBITER MMC DR#1182 C-1-653

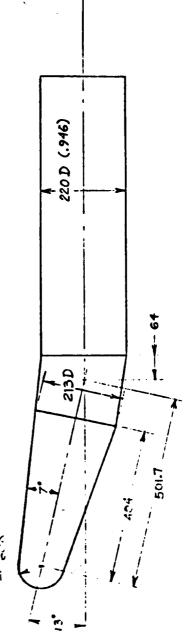
FIGURE 14. DROP TANK - DZ

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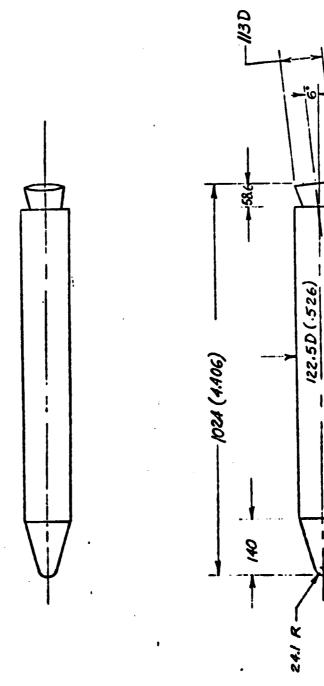
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MOTOR (SRM) ~ SI FIGURE 15. 5 SEGMENT



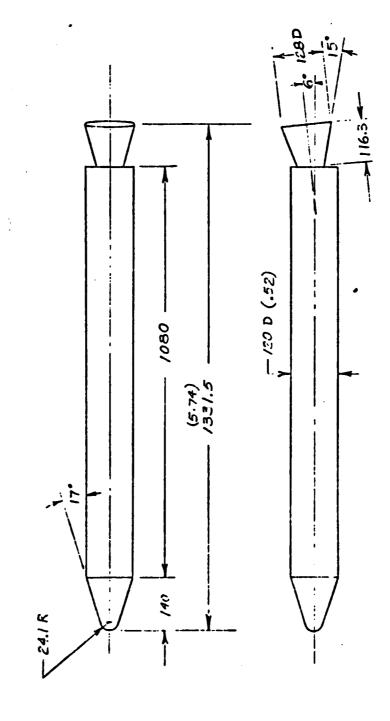
UNIQUE CONFIGS. BOOSTER
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MMC
DR#1182 C-1- 655

UNIQUE CONFIGS. BOOSTER MMC UNIQUE CONFIGS. ORBITER MMC DR#1182 C-1-656

7 SEGMENT

FIGURE 16

NOTES 1. ALL DIMENSIONS ARE IN WCHES 2. DIMENSIONS IN PAKENTHESIS ARE MODEL: VALUES (SRM) ~ SOLID ROCKET MOTOR



## TEST MSFC TWT 49/ DATA SET COLLATION SHEET

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FIGURE 2. G-11 Orbiter/S-IC 0.003366 Scale Model

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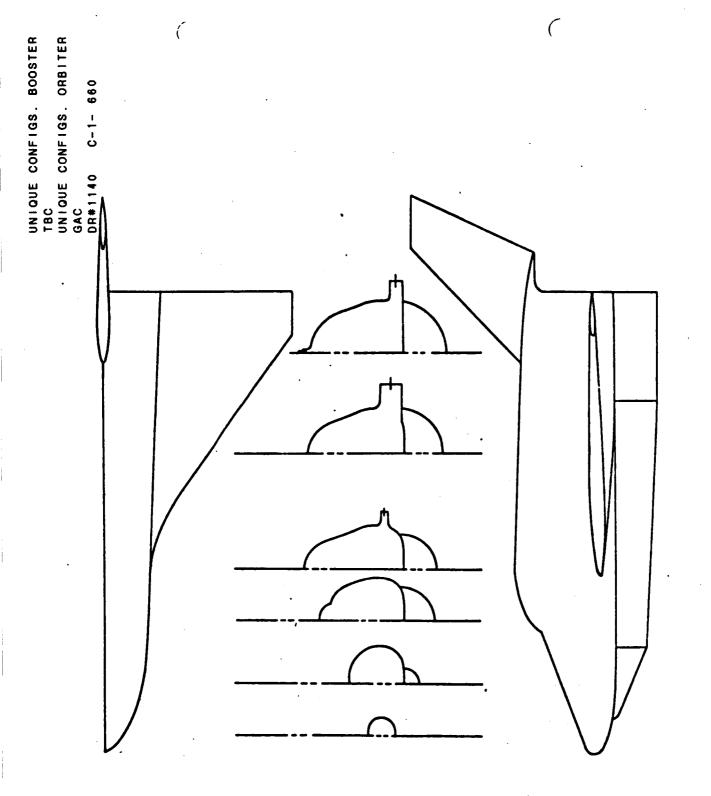
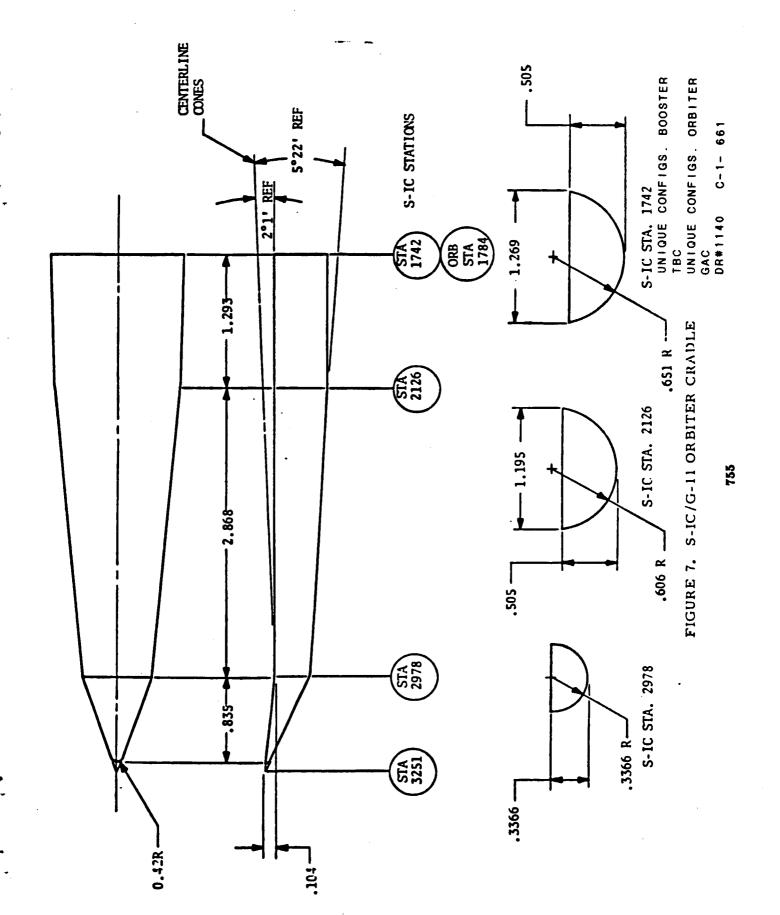
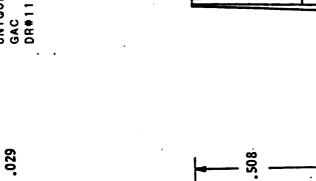


FIGURE 6. G-11 ORBITER WITH CRADLE 754





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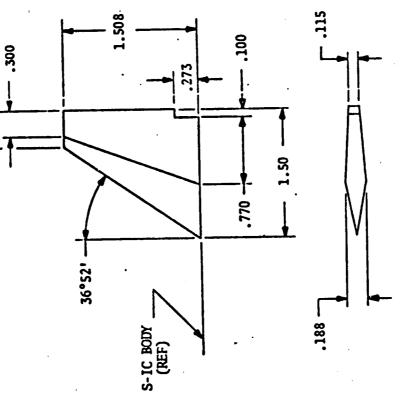


FIGURE 9, 884 SQ. FT. S-IC FIN - F

FIGURE 10, 900 FT<sup>2</sup> S-IC FIN - F<sub>1</sub>

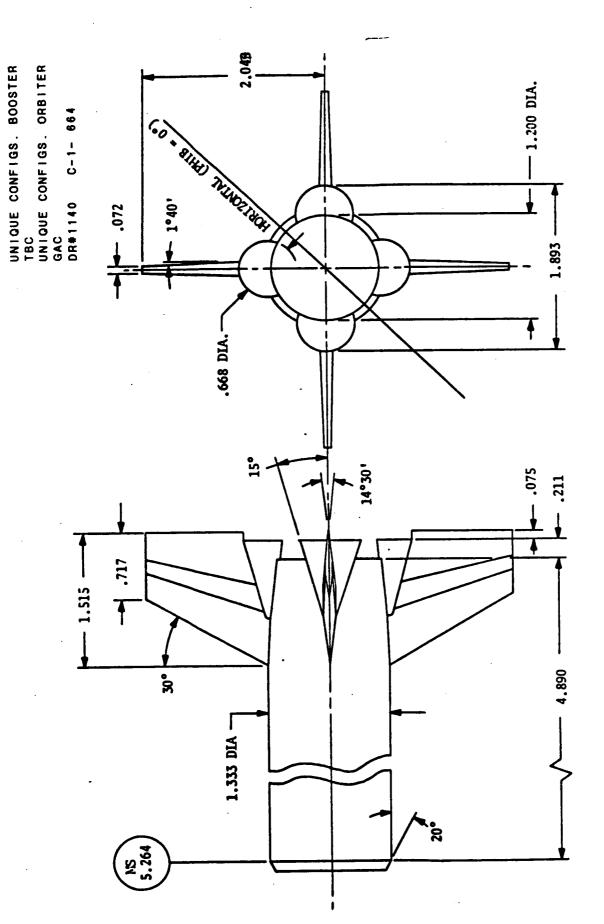


FIGURE 11. S-IC 45° FIN CONFIGURATION - FI

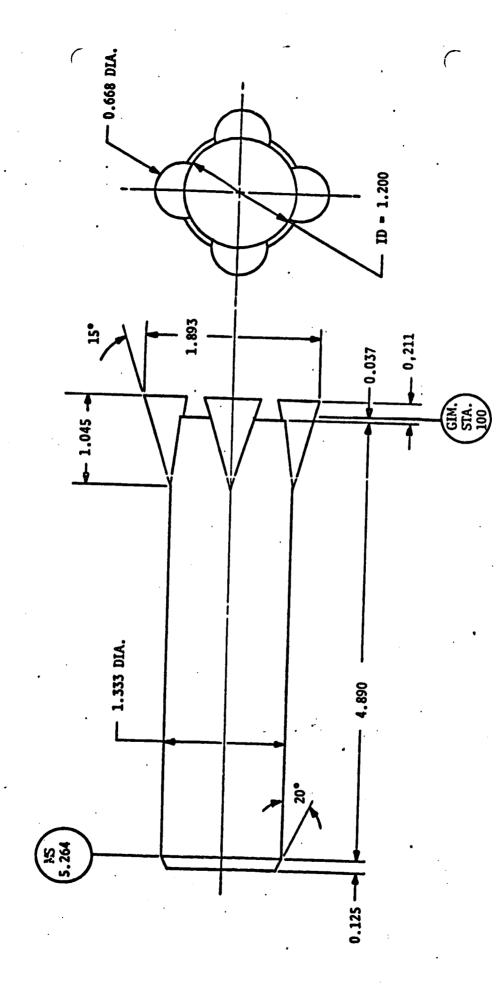


FIGURE 12. SATURN V/S-IC BOOSTER FINS OFF

● USED FOR BOTH 120 AND 90 GRUT ● 104 BACK OF LEADING EDGES EXCEPT AS NOTED ● 0.10" MIDTH AT ROOT TAPERING TO 0.05" AT TIP ON WINGS AND FINS ● STRIP ON LOWER SURFACE OF WING SAME AS TOP

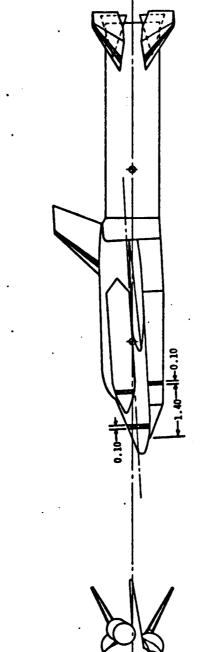


FIGURE 13. TRIP STRIP CHART S-IC/G-11 ORBITER

· FIGURE 14. BASE PRESSURE TAP LOCATIONS

162

PATASET COLLATION SHEETS	DATA SET/RUN NUMBER	SUMMARY
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UNIQUE CONFIGS. ORBITER
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DR#1187 C-1- 668

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UNIQUE CONFIGS. ORBITER

C-1- 669

GAC DR#1187

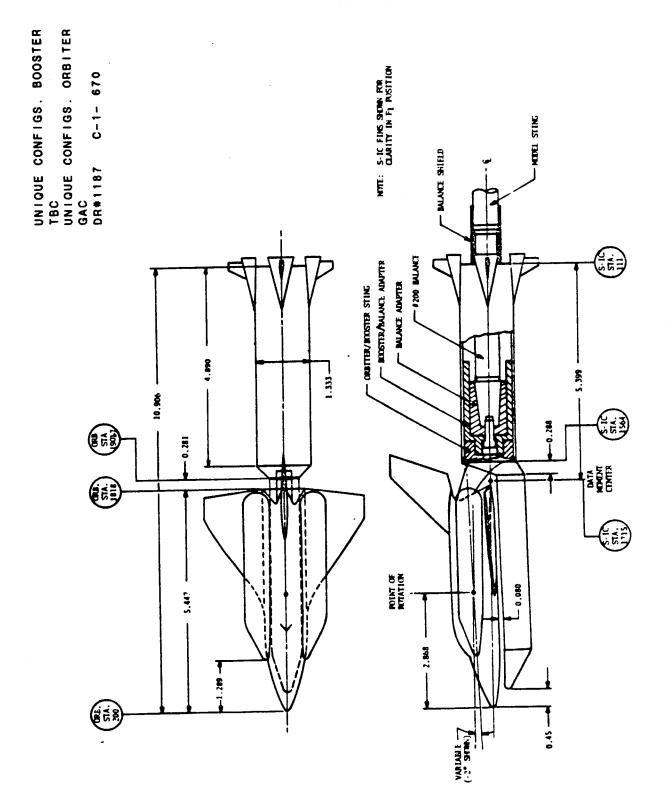


Figure 1. S-IC/H-33 Grummen Orbiter



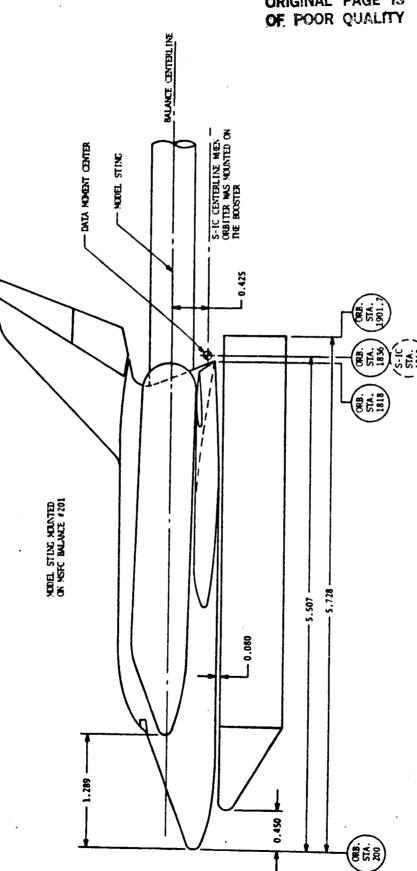
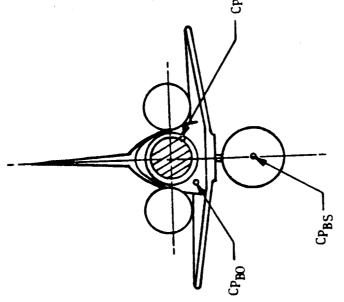


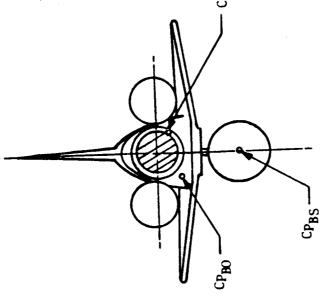
FIGURE 3. 11-33 GRUNMAN ORBITHR WITH S-IC CRADLE

UNIQUE CONFIGS. ORBITER GAC DR#1187 C-1- 672



CAVITY PRESSURE TAP CPC

CPB1 7



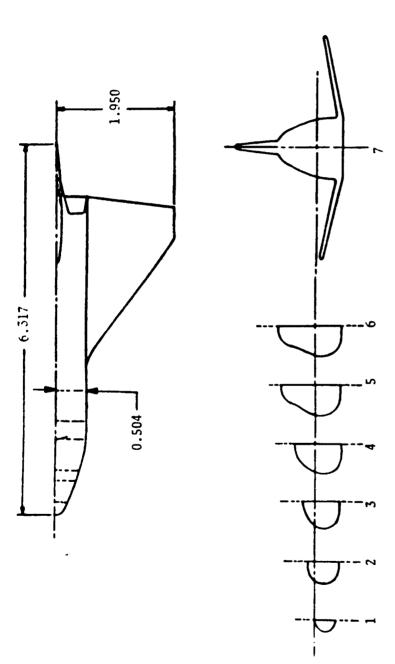
BOOSTER BASE PRESSURE LOCATIONS

STING -

BALANCE SHIELD -

ORBITER + CRADLE BASE PRESSURE LOCATIONS

Figure 4. Booster and Orbitar Plus Cradle Base Pressure Locations



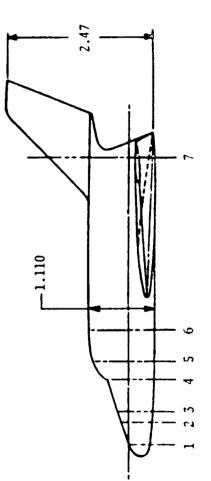


Figure 5. Orbiter Body Model Component (0)

UNIQUE CONFIGS. BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1187 C-1- 673

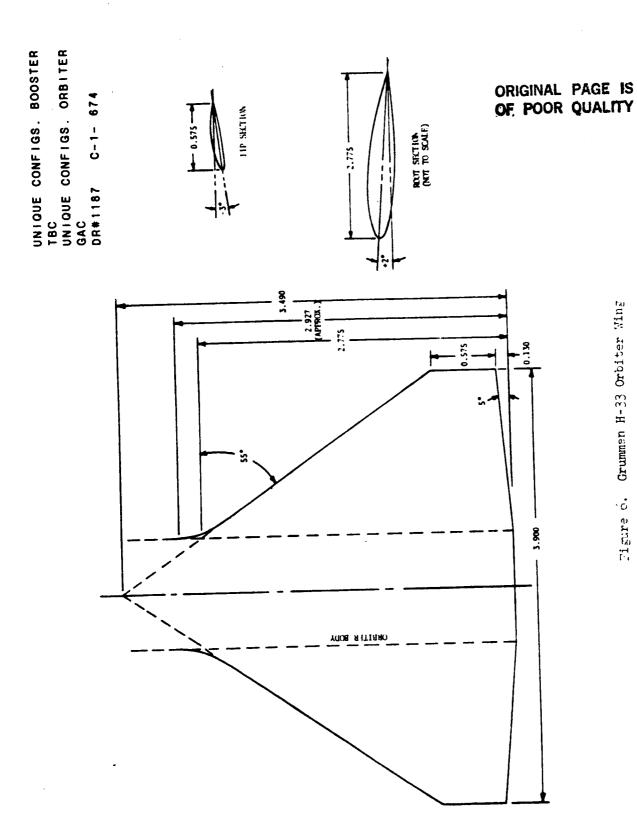
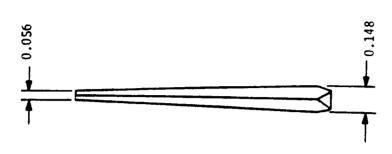
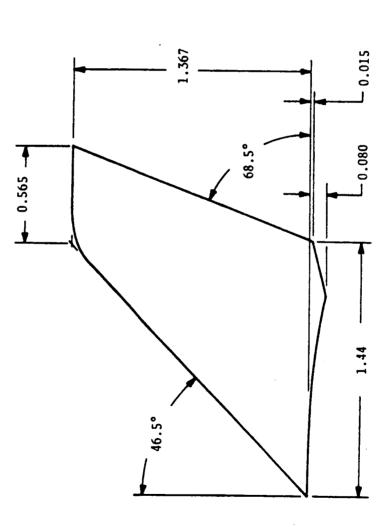


Figure 6. Grummen H-33 Orbiter Wing



UNIQUE CONFIGS. BOOSTER TBC
UNIQUE CONFIGS. ORBITER GAC
DR#1187 C-1- 675



FICURE 7. GRUMMAN H-33 ORBITER VERTICAL TAIL

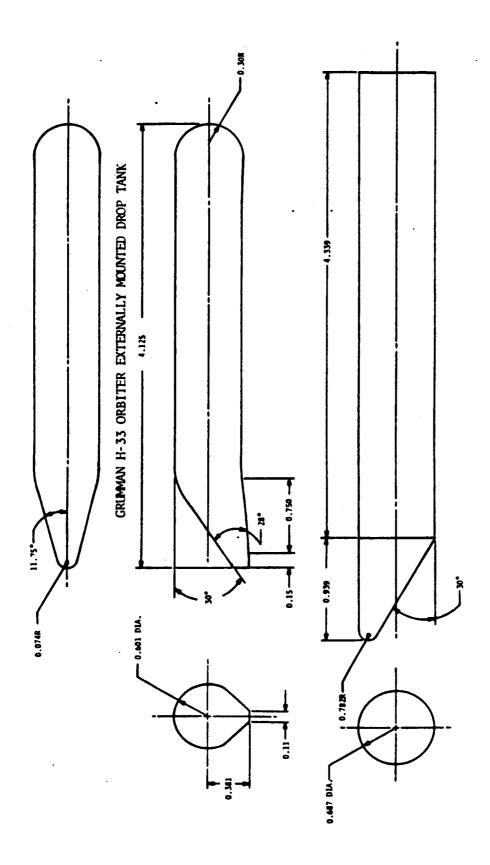
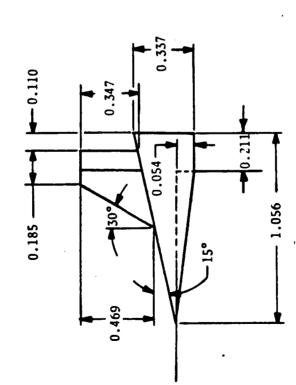


Figure S. Grumman H-33 Orbiter/S-IC Cradle Assembly



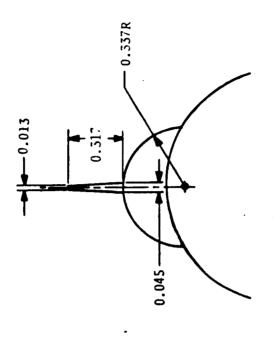


FIGURE 9. S-IC EXXINE SHROUD AND 75 SQ. FT. FIN

UNIQUE CONFIGS. BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1187 C-1- 677

APPENDIX C-2

MODEL FIGURES

LAUNCH AIRLOADS

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## PRESSURE DATASET COLLATION SHEET TEST AEDC 1163

TABLE I

PRETEST X POSTTEST

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(1)-Characters A through I refer to booster body, upper wing, lower wing, canard, & base, and orbiter body, upper wing, lower wing, & base, respectively.

(2)-Characters I through 5 refer to angles of attack of -10, -5, 0, +5, & +10 degrees, respectively. NOTES:

<u>.</u>

αorβ SCHEDULES

A(α)= -10, -5, 0, +5, +10 B(α)= -5, 0, +5

DELTA WING ORBITER MDAC C-2- 1 CANARD BOOSTER MDAC

CANARD BOOSTER MDAC DELTA WING ORBITER MDAC

TABLE I (Continued)

TEST AEDC 1163. PRESSURE DATASET COLLATION SHEET

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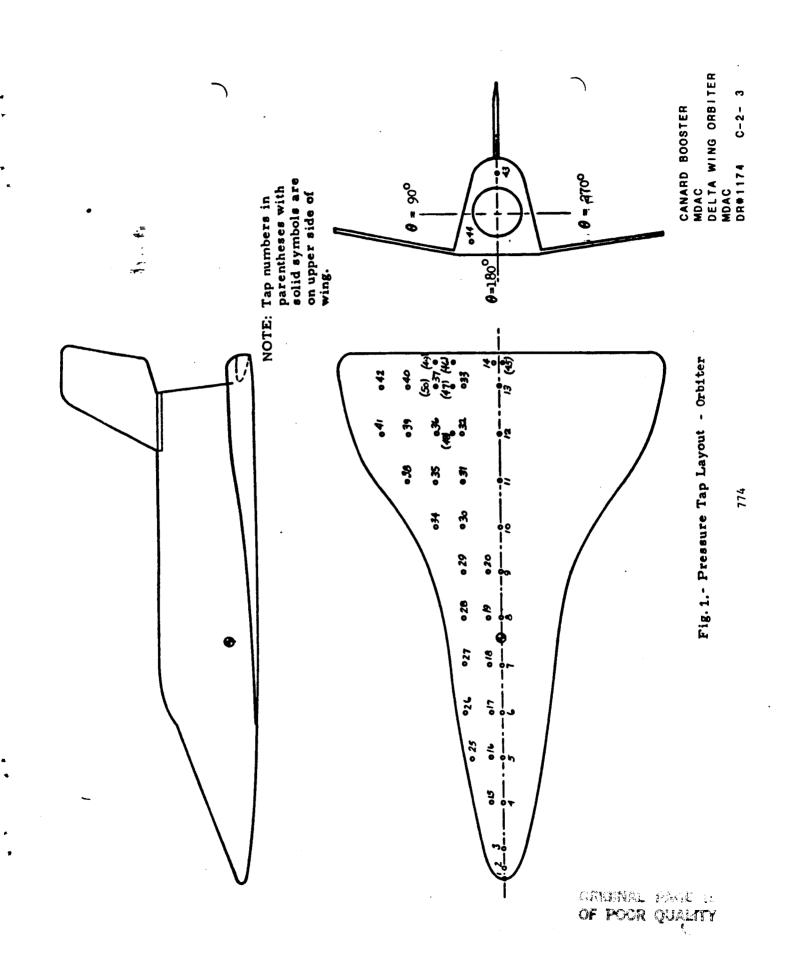
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(1)-Characters A through I refer to booster body, upper wing, lower wing, canard, & base, and orbiter body, upper wing, lower wing, & base, respectively.
(2)-Characters 1 through 5 refer to angles of attack of -10, -5, 0, +5, & +10 degrees, respectively. NOTES:

 $\alpha \text{ or } \beta$ SCHEDULES

λ(α)= -10, -5, 0, +5, +10 Β(α)= -5, 0, +5



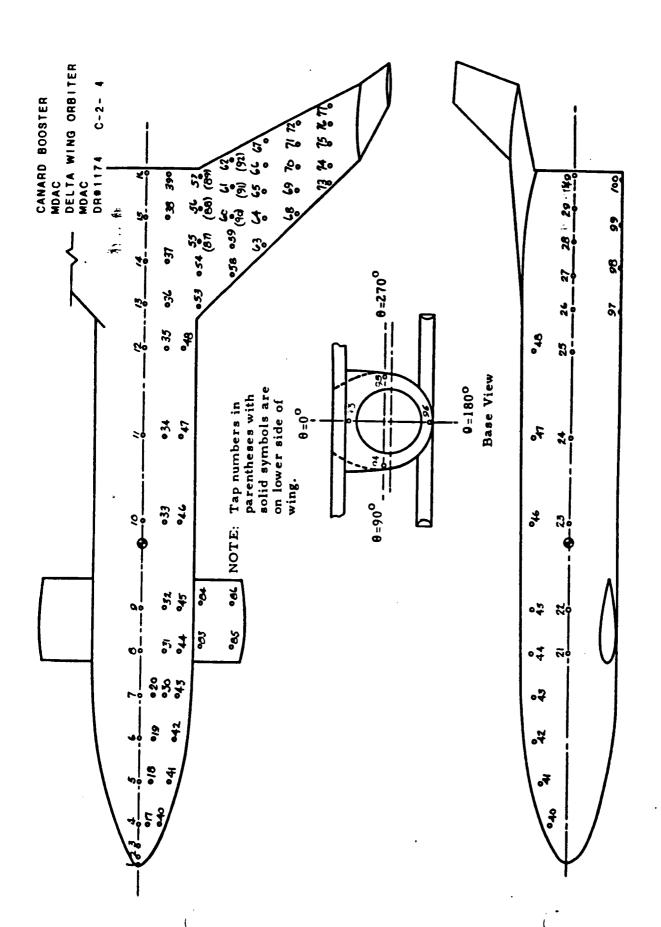


Fig. 2 - Pressure Tap Layout - Booster

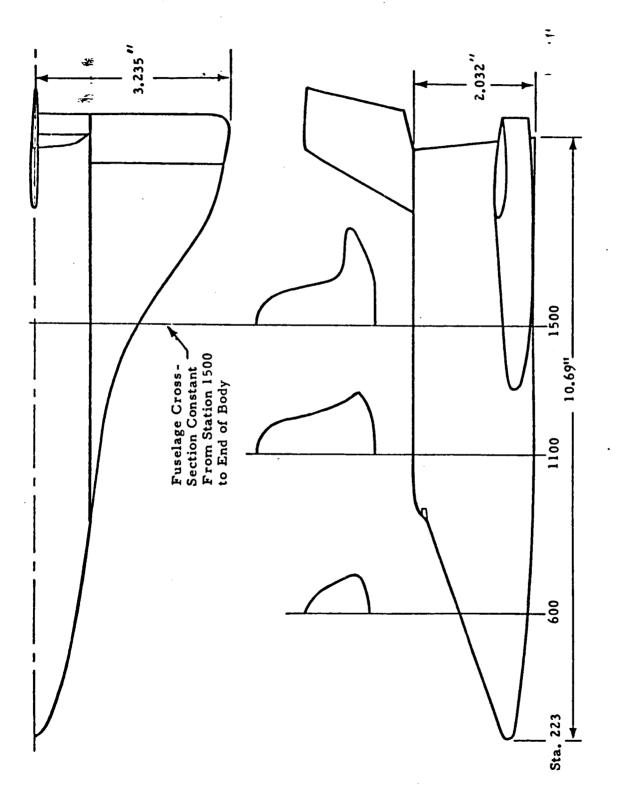


Fig. 3 - Modifications to Orbiter Model

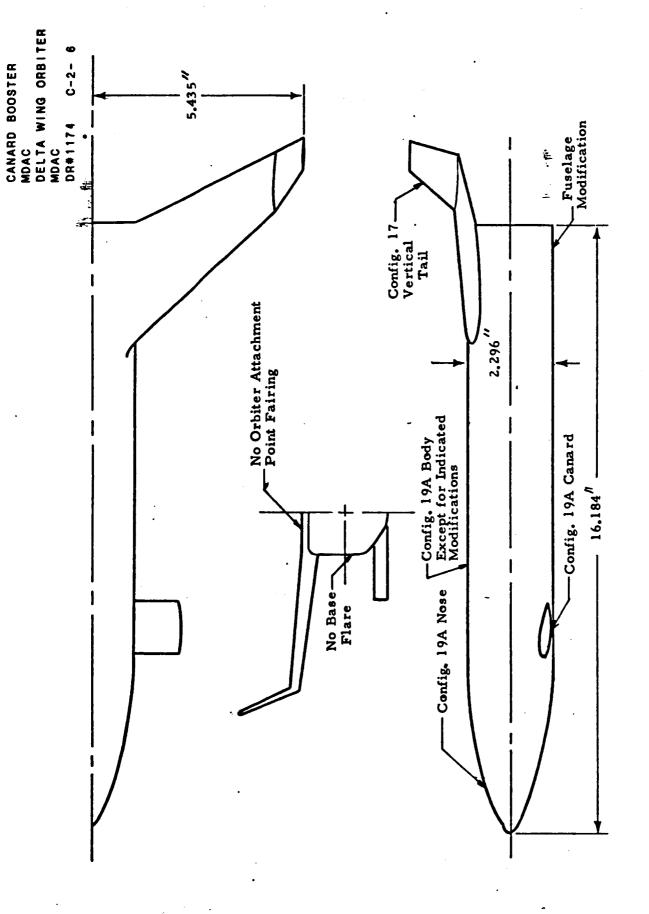
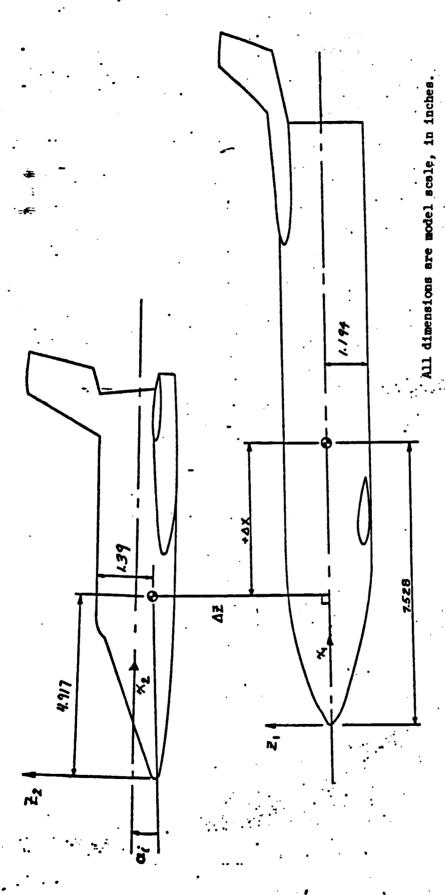


Fig. 4 - Modifications to Booster Model



Pigure 6. Separation Momenclature and Center of Gravity Locations

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1174 C-2-7

CANARD BOOSTER MDAC DELTA WING ORBITER MDAC

C-2-

DR#1222

PRETEST X POSTTEST

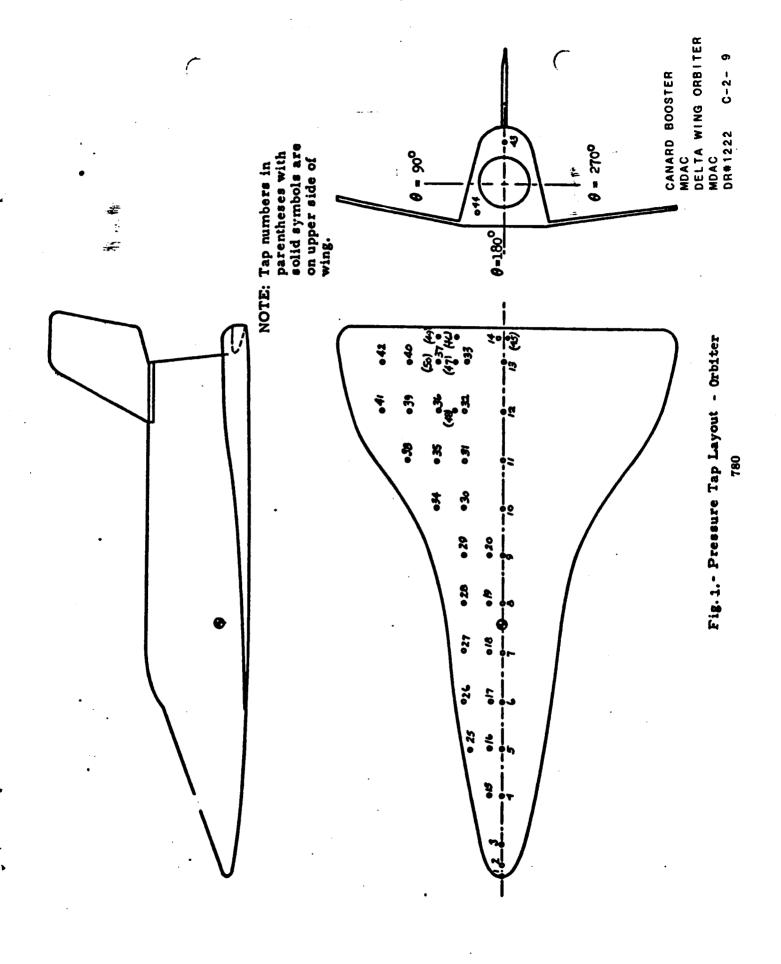
TEST AEDC TO 174 PRESSURE DATASET COLLATION SHEET

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First character of each detaset identifier denotes model section: A through I refer to booster body, upper wing, lower wing, and base, respectively. NOTE (1):

P(a)-partiel schedule A C(B)=-4,-2, 0,+2,+4 degrees A(α)=-8,-6,-4,-2, 0,+2,+4,+6,+8,+10 degrees B(B)=-6,-4,-2, 0,+2,+4,+6 degrees a OR β SCHEDULES

 $D(\beta)=-b$ , +b degrees (plotted data includes  $\beta$ -O at  $\alpha$ =-6 or +6 from corresponding  $\alpha$ -variant dataset)



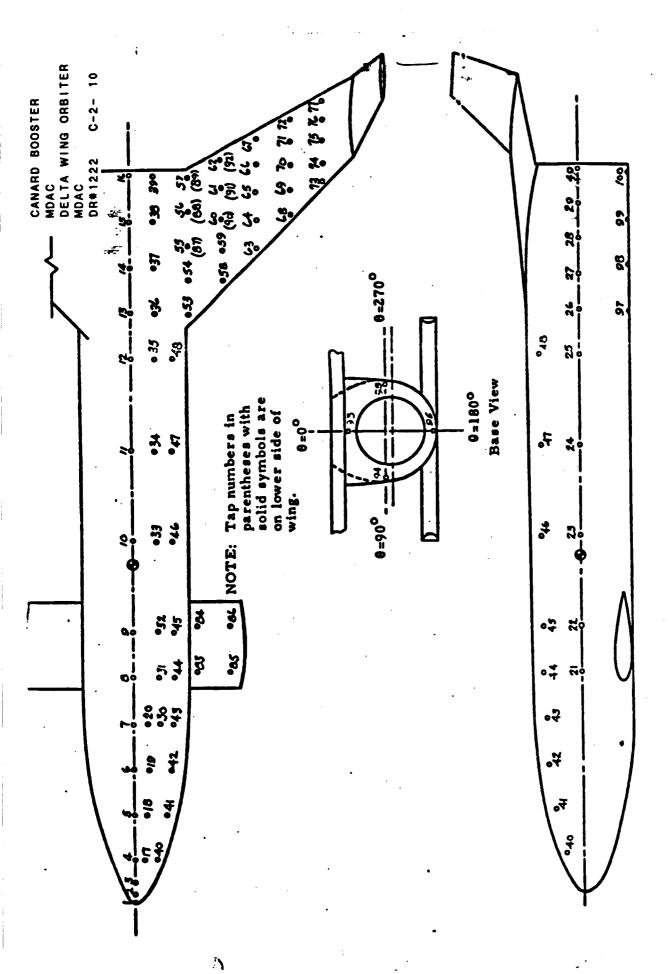


Fig. 2 - Pressure Tap Layout - Booster

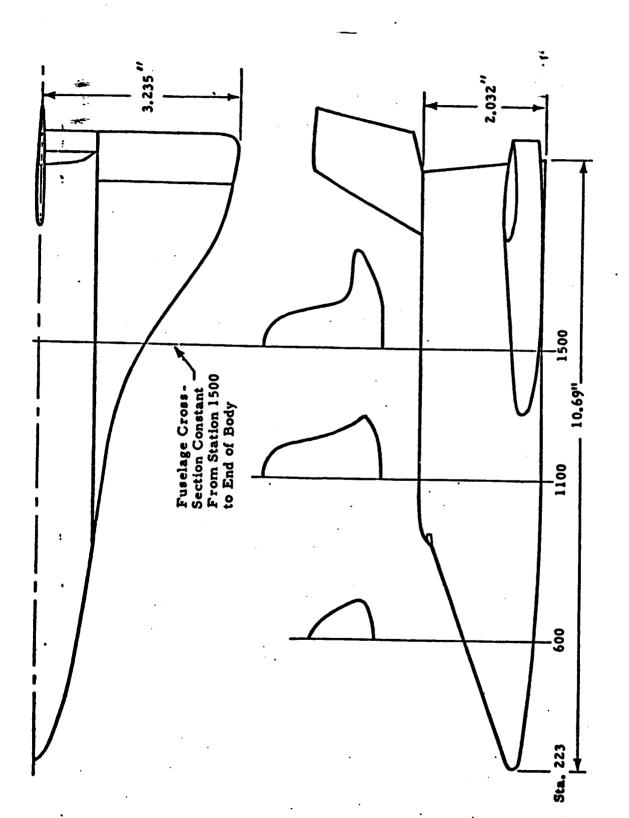


Fig. 3 - Modifications to Orbiter Model

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1222 C-2-11

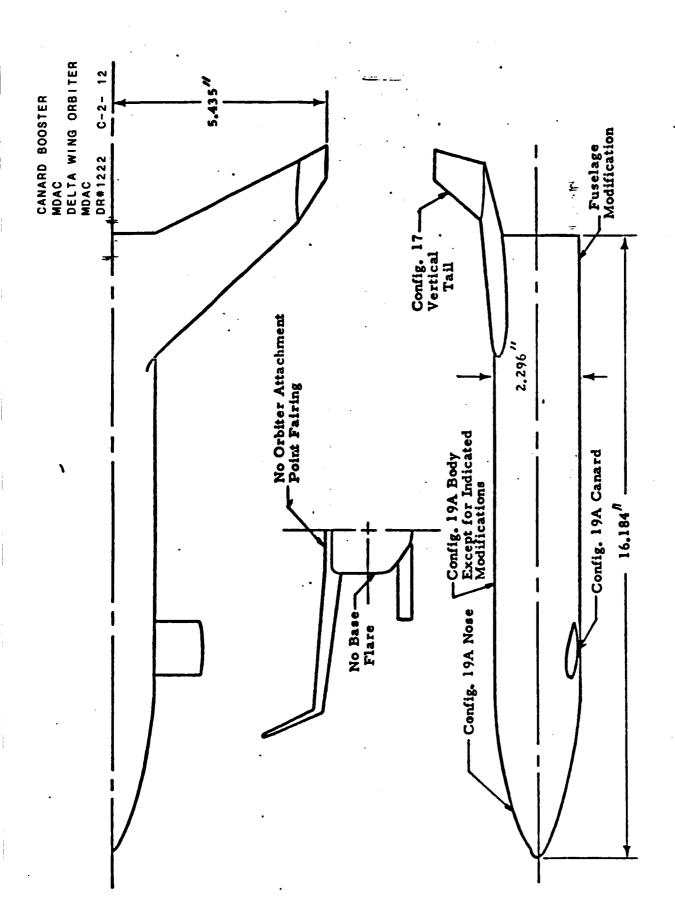


Fig. 4 - Modifications to Booster Model

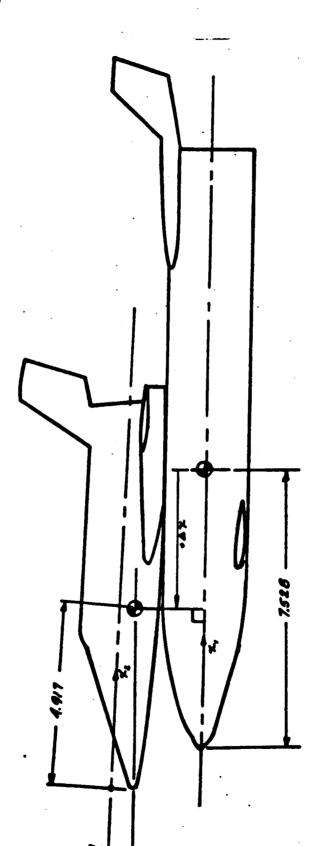


Figure 5: Model Separation Variables

CYLINDRICAL BOOSTER

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TABLE II. (Continued)

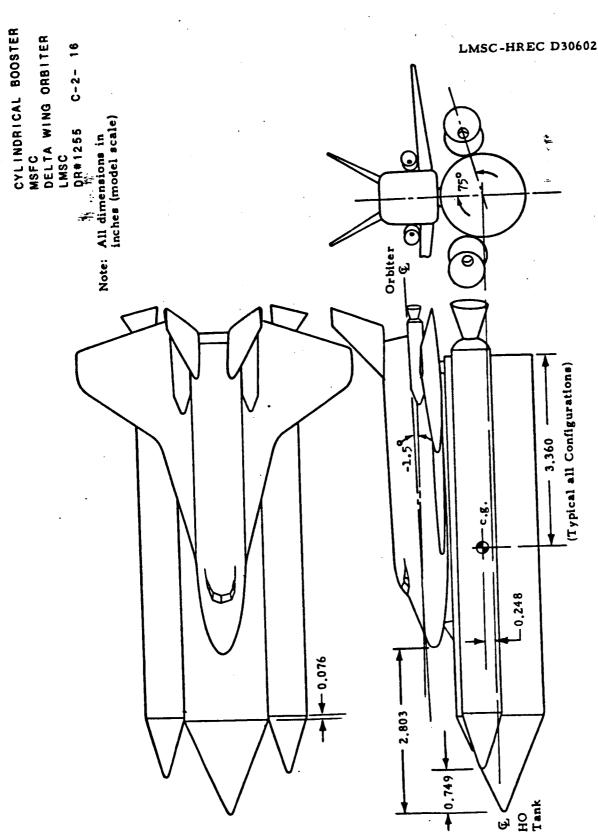


Fig. 2 - Baseline Launch Vehicle

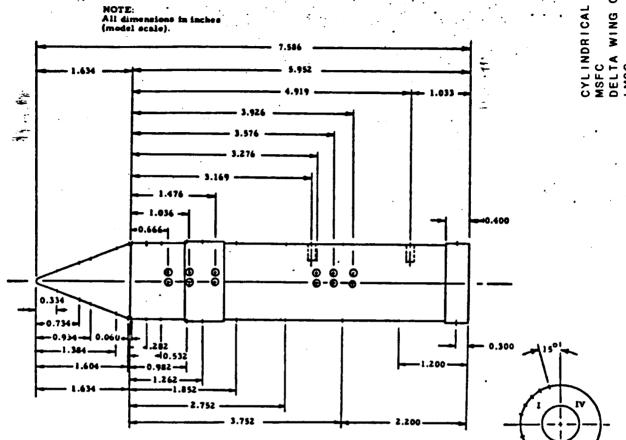


Fig. 4 - HO Tanh Pressure Orifice Location

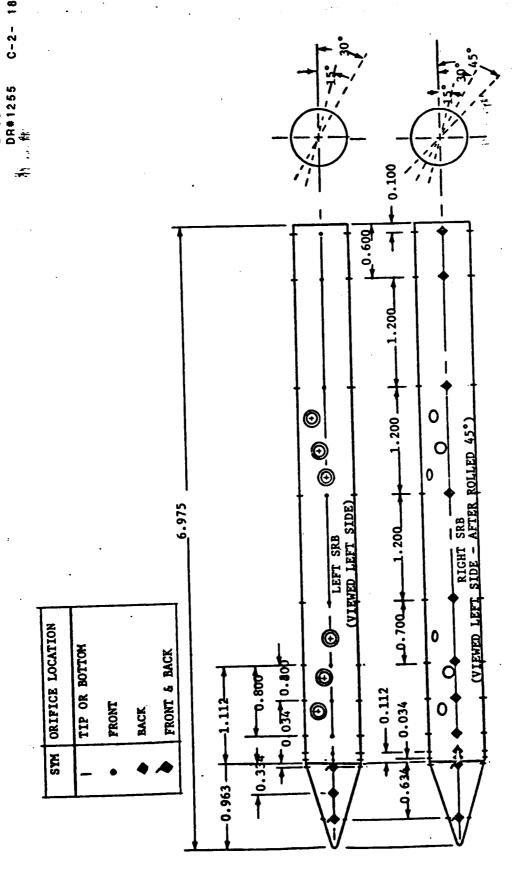
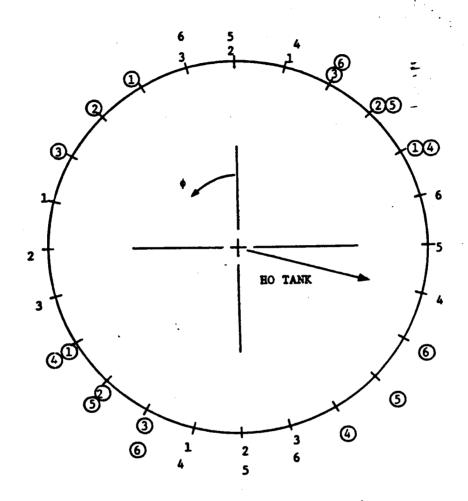


FIGURE 5. ORIFICE LOCATIONS ON SRB'8

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AFT VIEW (REFERENCED TO LEFT SRB)

- 1 SRB POSITION I (LEFT SRB)
- 2 = SRB POSITION II
- 3 SRB POSITION III
- 4 SRB POSITION I + 180
- 5 SRB POSITION II + 180
- 6 SRB POSITION III + 180

NOTE: CIRCLED NUMBER, (3), REPRESENTS ORIFICE LOCATED ON RIGHT SRB REFERRED TO THE LEFT SRB

FIGURE 6. COMPOSITE OF RADIAL LOCATIONS OF ORIFICES ON SRB FOR VARIOUS BOLT PATTERNS

TEST MSFC 1WT 540 DATA SET/RUN NUMBER COLLATION SUMMARY

CYLINDRICAL BOOSTER MSFC DELTA WING ORBITER MSFC

C-2- 20

11 DR#1259

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Fig. 1 - Baseline Launch Vehicle

Note: All dimensions in inches (model scale)

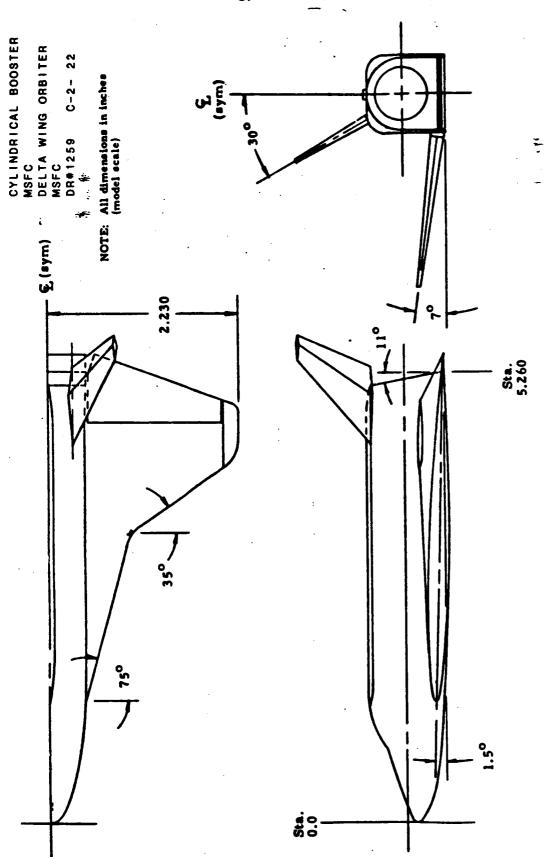


Fig. 2- General Arrangement, Space Shuttle 049 Orbiter

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Note: All dimensions in inches (model scale)

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Engine Nozzle

Fig. 3- 156-Inch Solid Rocket Motor

Numbers in parenthesis are on the lower surface

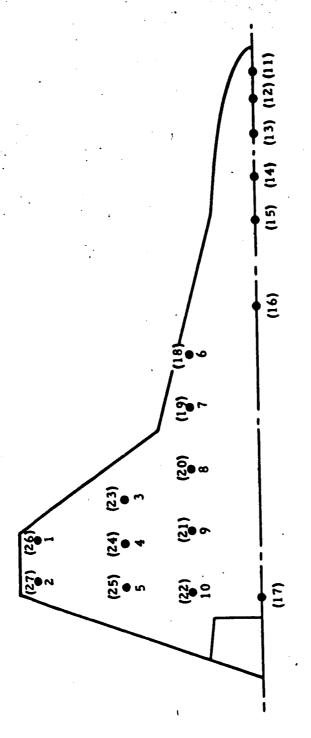


Fig. 4 - Static Pressure Tap Positions

DATA SET COLLATION SHEET

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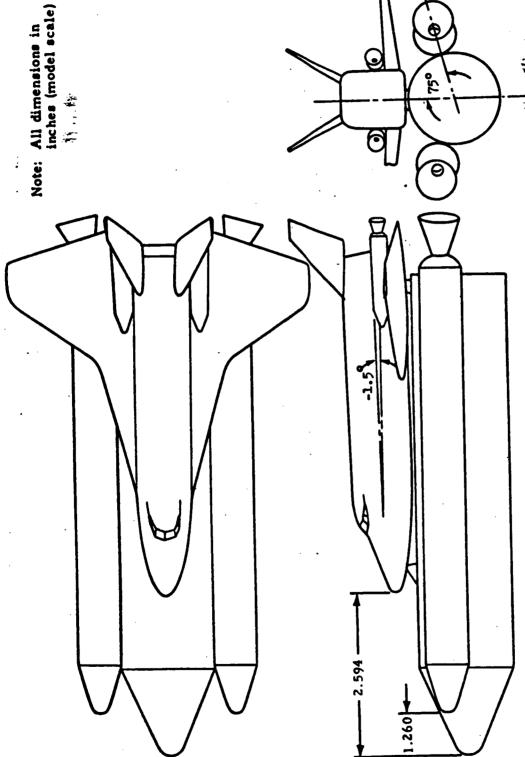
797

G: A=-8408 by Ad=2": B=-C, +0" 2"C": C=-8"-C,-4,10" 2,4"C; B: A=-C+C-b, AB=2": B=-C, 0,2,C": C=-C,-4"O, 2,4"C;

MSFC . Form 363-2 (February 1972)

a or B SCHEDULES

Fig. 1 - Baseline Launch Vehicle



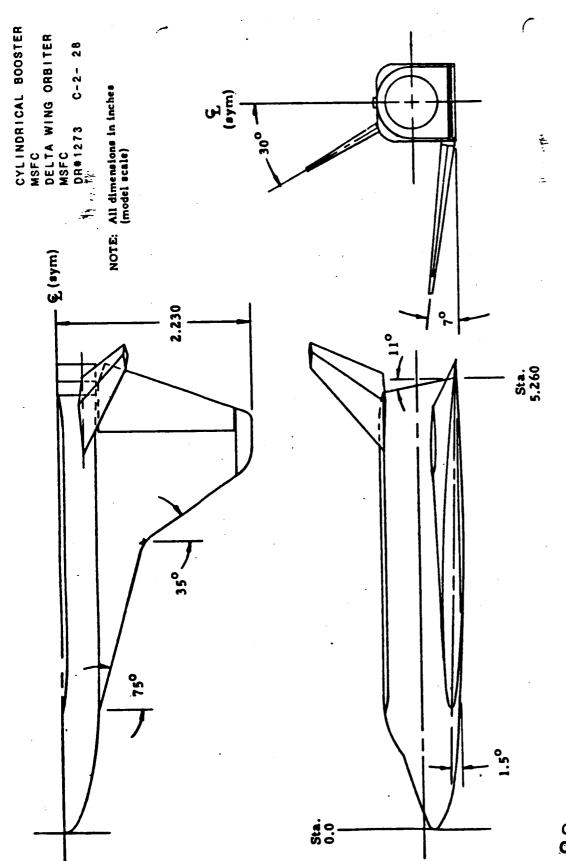


Fig. 2- General Arrangement. Space Shuttle 049 Orbiter

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Note: All dimensions in inches (model scale)

- 6.012 -

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Engine Nozzie

Fig. 3- 156-Inch Solid Rocket Motor

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CYLINDRICAL BOOSTER MSFC DELTA WING ORBITER MSFC DR#1273 C-2- 29

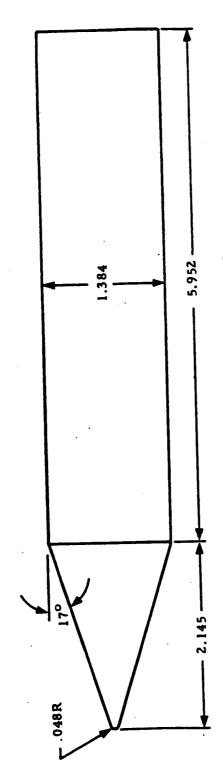


Fig. 4 - 346-Inch Diameter HO Tank with 17-Degree Nosecone

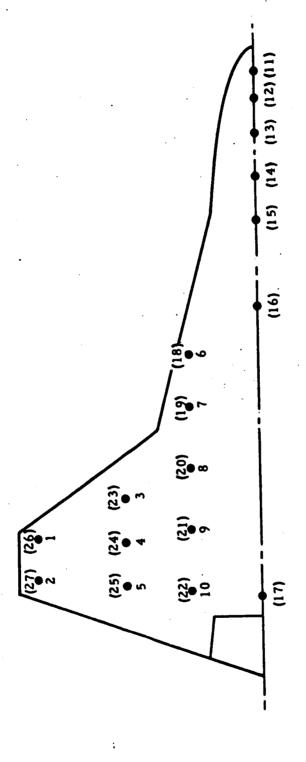


Fig. 5 - Static Pressure Tap Positions

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CYLINDRICAL BOOSTER MSFC DELTA WING ORBITER MSFC DR#1273 C-2-31

TABLE V

STRAIGHT WING BOOSTER GD/C

DELTA WING ORBITER NR

32

C-2-

DR#1129

TEST AND SECTION SHEET

STRAIGHT VING BOOSTER ALONE DATA

0.9 | 1.2 | 1.5 | 2.0 Ħ 2 13 ω 7 9.0 ន NO. OF RUNS PARAMETER/VALUES % SCHD. 8 GEO. CONFIG. N VERTICAL TAIL LOWER WING UPPER HORIZ. TALL TALL VERTICAL TAIL CPPER HORIZ. CONER HORIZ. TAIL LOWER WING UPPER HORIZ. TAIL. PERTICAL TAIL UPPER WING UPPER WING LOWER WING UPPER WING MODEL SECTION BODY BODY BODY CONFIGURATION BLW3AV1TT DATASET IDEN TIFIER BAXH18 BAXB13 BAXW13 **BAXH1.3** BAXV13 BAXW17 BAXW18 BAXV11 BAXEL7 BAX712 BAXW16 BAXB12 BAXW12 BAXH12 BAXW11 BAXH11 BAXE16 BAXB11

R (a) 30°, 35°, 40°, 45°, 50°, 55° q (a) 40°, 45°, 50°, 55°, 60°, 65° ε (a) -12°, -5°, 0°, 4°, 12° က္ခ L (a) -16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, P (a) 16°, 20°, 25°, 30°, 35°, 40° T(a) 16°, 20°, 25°, 30° T(b) -10°, -5°, 0°, 5°, 10° 2) x/(B/2), x/C, z/C X, THETA, R GEOMETRY CONFIGURATION a OR β SCHEDULES

TABLE V (CONTINUED)

PRESSURE DATASET COLLATION SHEET TEST AMES 6x6 509 STRAIGHT VING BOOSTER DATA - IN PRESENCE OF DELLA VING ORBITER

☐ PRETEST (X) POSTTEST

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UPPER, WING.   2	BAXW21			UPPER WING	2					_	4	1	<u> </u>	#	#	#		$\perp$		
UPPER WING   2	BAXW26			LOWER WING	2			$\dashv$	_	_	_	_	$\pm$	$\exists$	#	#	1	1		
VERTICAL DAIL   2	PAXH21			UPPER HORIZ.	2	=	=	$\dashv$	$\dashv$	$\downarrow$	_	1	#	$^{\ddagger}$	#	$\downarrow$	1	_		
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Note	BAXV21			VERTICAL TAIL		-			_	_	4		-	-		1				
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UPPER WING 2   1	BAXWZT			LOWER WING	2			$\dashv$	-	$\dashv$	_				_	$\dashv$				
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VERTICAL TAIL   2   4   4   4   5   3   37	BAXH27			LOWER HORIZ.	2	$\exists$	$\dashv$	-	-	_	_	$\exists$	$^{\dagger}$	$\downarrow$	$\downarrow$	#	_	1		
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1) X, THETA, R  2) Y(C, 2/C, -2, 0°, 2°, 4°, 6°, 8°, 12°, 4°, 5°, 5°, 5°, 5°, 5°, 5°, 5°, 5°, 5°, 5	BAXB23			BODY		_	%		_	4	$\rightrightarrows$	댴	-	-	-+	-+		_		
1) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 2) X, THETA, R 3) X, THETA, R 4) X, THETA, R	BAXW23			UPPER WING	2	$\exists$	$\exists$	-	_	_	$\exists$	4	_	#	#	#	_	_		
1) X, THETA, R  2) X, THETA, R  3) X, THETA, R  3) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R	BAXW28			LOWER WING	2					_				_	_	$\dashv$	_	$\downarrow$		•
1) X, THETA, R  1) X, THETA, R  2) Y(B/2), X/C, Z/C  1 (a) -16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°  1 (a) 16°, 20°, 25°, 30°, 35°, 40°  1 (b) -10°, -5°, 0°, 5°, 10°  1 (c) 16°, 20°, 5°, 10°  1 (d) 16°, 20°, 5°, 10°  2 (e) 16°, 20°, 5°, 10°  2 (f) 16°, 20°, 5°, 10°  3 (f) 16°, 20°, 5°, 10°  4 (f) -10°, -5°, 0°, 5°, 10°  5 (f) -10°, -5°, 0°, 5°, 10°  6 (f) -10°, -5°, 0°, 5°, 10°  1 (f) -10°, -5°, 0°, 5°, 10°  2 (f) -10°, -5°, 0°, 5°, 10°  3 (f) -10°, -5°, 0°, 5°, 10°  4 (f) -10°, -5°, 0°, 5°, 10°  5 (f) -10°, -5°, 0°, 5°, 10°  7 (f) -10°, -5°, 0°, 5°, 10°  8 (f) -10°, -5°, 0°, 5°, 10°  8 (f) -10°, -5°, 0°, 5°, 10°  904	RAXE23			UPPER HORIZ. TAIL	2			$\dashv$	$\dashv$	_	4	$\dashv$	$\exists$	#	$\dashv$	#	$\perp$	$\downarrow$		
1) X, THETA, R  1) X, THETA, R  10N 2) Y/(B/2), X/C, Z/C  1 (a) 16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°  1 (a) 16°, 20°, 25°, 30°  1 (b) -10°, -5°, 0°, 5°, 10°  1 (c) 16°, 20°, 55°, 30°  1 (d) 16°, 20°, 55°, 30°  1 (e) 16°, 20°, 55°, 30°  2 (e) 40°, 45°, 50°, 60°, 60°, 60°, 60°, 60°, 60°, 60°, 6	BAXB28			LOWER HORIZ. TAIL	2	$\exists$		+	-	_	$\dashv$	$\dashv$	$\downarrow$	1	#	+	_	$\downarrow$		•
1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  2) X/(2, 2/c  2) X/(2, 2/c  30 X/(2, 20, 20, 20, 20, 40, 60, 80, 120  2) X/(2) X/(2, 20, 20, 20, 20, 20, 40, 120  3) X/(2)	BAXV23		<b>\</b>	VERTICAL TAIL	2	-	-	-	$\dashv$	$\dashv$	-	<u>-  </u>	-	1	-	-	$\downarrow$	1	,	
1) X, THETA, R  1) X, THETA, R  1 x, THETA, R  1 x, THETA, R  1 x, THETA, R  1 x, THETA, R  1 x, THETA, R  1 x, THETA, R  1 x, THETA, R  1 x, The solution of the solution of								-	+	+	_			$\bot$	_					
10N 2) X/(B/2), X/C, Z/C  1 (a) 16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°  1 (a) 16°, 20°, 25°, 30°, 30°  1 (a) 16°, 20°, 55°, 30°  1 (b) -10°, -5°, 0°, 5°, 10°  1 (c) 16°, -10°, -5°, 0°, 5°, 10°  2 (c) 40°, 40°, 40°, 40°, 12°  3 (d) 40°, 40°, 40°, 12°  4 (e) 40°, 40°, 40°, 12°  5 (f) 40°, 40°, 50°, 12°  6 (f) 40°, 40°, 50°, 12°  7 (g) -10°, -5°, 0°, 5°, 10°  80.4			ı				1	1	$\frac{1}{2}$	4	4		]	-	4				_	
I (a) -16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°       R (a) 30°, 35°, 40°, 45°, 50°, 65°, 65°         F (a) 16°, 20°, 25°, 30°, 35°, 40°       S (a) -12°, -5°, 0°, 4°, 12°         T (a) 16°, 20°, 25°, 30°       S (a) -12°, -5°, 0°, 4°, 12°         H (β) -10°, -5°, 0°, 5°, 10°       STRAIGHT WING OF LTA WIN	GEOMETR	•		χ χ(c,							$\  \ $	$\  \ $					į			
T(a) 16°, 20°, 25°, 30°, 35°, 40°  T(a) 16°, 20°, 25°, 30°  T(b) -10°, -5°, 0°, 5°, 10°  STRAIGHT WIS  BOLTA WING  NR		•	٦	-80 -50 -5	%	0					•							1		
T(a) 16°, 20°, 25°, 30°  T(a) 16°, 20°, 25°, 30°  T(b) -10°, -5°, 0°, 5°, 10°  BDELTA WING  NR  804	SCHEDULE	•	(a) 16°, 20°	50, 300, 350,	B				, ,					[~]	- 1	22				
, 0°, 5°, 10° STRAIGHT WI GD/C DELTA WING NR		•	(a) 16°, 20°	25°, 30°									_[	1		2	27	•		
ODITALIST COLOR OF THE COLOR OF	•		(B) -10°, -5	9°, 5											C			N	BOORTED	0
. DELTA WING														-	n O	0/C	ב ב			5
					•										02	ELTA			ORBITER	
							3	•							2 6	0 * 1 1	0	C-2	33	

STRAIGHT WING BOOSTER GD/C DELTA WING ORBITER NR

C-2- 34

TEST ANES 6 x 6 509 PRESSURE DATASET COLLATION SHEET

TABLE V (CONTIDUED)

STRAIGHT WING BOOSTER DATA - IN PRESENCE OF STRAIGHT WING ORBITTER

10R41129 1.2 1.5 2.0 91 2 11 ន 81 23 6.0 67 ₹ 9.0 8 NO. PUNS PARAMETER/VALUES % SCHO. 8 <del>ر</del>ه GEO. CONFIG. VERTICAL TAIL LOWER WING UPPER HORIZ. TOWER HORIZ. TAIL VERTICAL TAIL UPPER HORIZ. TAIL TOWER HORIZ. UPPER WING UPPER WING LOWER WING MODEL BODY BODY BINJAVITT/BEHIOHLZVS CONFIGURATION DATASET BAXB32 **BAXE**31 BAXV31 BAXW32 BAXW37 BAXE 31 BAXH31 BAXH36 BAXV31 BAXB31 BAXW36 BAXW31

9 (a) 40° 45° 50° 50° 60° 65° 8 (a) -12° , -5° 0° 4° 12° R (a) 30°, 35°, 40°, 45°, 50°, °त्र 20, 40, 60, 80, -20,00 1 (p) -100, -50, 00, 50, 100 1) X, THETA, R 2) I/(B/2), X/C, Z/C -120 L (a) -16°, P (a) 16°, T (a) 16 GEOMETRY CONFIGURATION a OR B SCHEDULES

FRUN 25 USES & SCHEDULE S

## TABLE V (CONTIDUED)

TEST ANES 6 x 6 509 PRESSURE DATASET COLLATION SHEET

DELLA VING ORBITER ALONE DATA

☐ PRETEST ☐ POSTTEST

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							r	ļ,			MACH NUMBERS	ABERS				
L		HODEL	GEO.	SCND.	PARAME	PARAMETER/VALUES	1	<u> </u>	H	Г	г	۲		_		
DATASET	CONFIGURATION	SECTION	CONFIG.	a B			~	2	0.6 0.9	7	7	+		T		
newski	9547 347.0	BODY	-	S-02				5	9	11 51	<u>-</u>	27		T		
DALLE .	2000	IPPER WING	~	-				_		$\exists$	7	<u> </u>				
DAXWII		TOUR UTIES	0	E			_					4				
DAXWWO		TABOARD VEAT														
DAXV4.1		CUTBOARD VERT.	2	+				E	-		•	+				
DAXV46		STAB.	7	ç	ļ		T	ļ	5	50 40	84	24				
DAXO942		BODY	1	و اد	1	1	†	‡	╁	十	╁	╁╌			Ol	OF
Darvag		UPPER WING	2	=	1	1	$\dagger$	‡	$\ddagger$	+	Ī	‡	1		F	<b>?</b> 10
DAXW47		LOWER WING	2				7	1	+	$^{+}$	$\pm$	‡			PO	IN
naxv42		INBOARD VERT.	2						_	$\dashv$	$\exists$	+	1		OF	AL
na why		OUTBOARD VERT.	2	Đ				7	+	十	╅	+	1		₹ Q	. P
Parali 2		BODY	1	м 00				7	8	55	27	2	$\downarrow$		ĮU,	AC
DAYAR3		UPPER WING	2					4	+	+	$\frac{1}{1}$	7	$\downarrow$		<b>ALI</b>	E
Davidia		TOWER WING	2					7	+	+	$\exists$	+	1		TY	IS
DAYOR 3		INBOARD VERT	٥						_			4	1		•	
Charles		OUTBOKKO VERT.	٩						-	<b>→</b>		_	4			
THEY AND		BUNK	-	8					19	8	8 8 8	27	4			
DAXB44		TOOL THE	٥	Ŀ		_			_			$\exists$				•
DAXWLIL		מנוגמע אדונס	.   '			-		$\vdash$								
DAXW49		LOWER WING		#		+		+					_	_		
DAXV44		STAB STAB		$\pm$		+		+	+	+		E	_			
DAXV49		STAB.	2			$\frac{1}{2}$		-	1	1	$\frac{1}{2}$	-				
GEOMETRY	1) x, THETA	x/c. z/c											ŧ			
Control	07.	0 0 0 0°	%	0,100	6.8	ुध		æ	$(a)$ $30^{\circ}$		•			074		
a OR B	9 9	250 300 3			1					71	, יי			65	•	
SCHEDULES	T (a) 16, 20	250, 300						S	$(a) -12^{0},$	°5	8	2	2	1		
•	97-	00, 50, 100														
												STR	STRAIGHT WING	Ž	3 BOOSTER	<b>e</b>
												GD/C		N S O	ORBITER	
				æ	5					•		N N				
				•	3							# #	DR#1129		•	

COLLATION SHEET	
DATASET	
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STRAIGHT WING BOOSTER	GD/C ET DELTA WING ORBITER NR	1 DR# 1129 C-2- 36
TABLE V (CONTINUED)	TEST ANES 6 x 6 509 PRESSURE DATASET COLLATION SHEET	DELTA WING ORBITER ALCHE DATA (Continued)

				9	┝	PARAMETER/VALUES	FR/VAI	1165	ě.			EAC.	MACH NUMBERS	2		
DATASET	CONFIGURATION	MODEL	CON FIG.	8	┼-	-			P.S.	9.0	0.0	1.2	1.5	2.0		
DAYTRUS	BSW1 3W10	BODY	-	1	ိ				3			3	63	62		
DATTAR		HPPER WING	٥	<b> </b>	-	_						4	-	-		
DATES		LOWER WING	_									$\dashv$	$\dashv$	-		
Parvies		INBOARD VERT.	2							]		7	7	$\frac{1}{1}$		
DAXVSO	-	OUTBOARD VERT.		-					+			-	-	-		
					_	-										
					-	_	L									
					$\vdash$	-										
					+	-	_									
					$\vdash$	$\vdash$	_				·					
					$\vdash$	-	_									$\perp$
						_	_									_
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						_	_	_								
					$\Box$											$\perp$
														$\bot$		_
				L											$\perp$	1
			· 	Ŀ									$\perp$	1		$\downarrow$
								_								_
GEOMETRY	1) X, THE	×													-	1
CONFIGURATION	2) Y/(B/2),	), x/c, z/c	P	١	0.0	ွ	٥			3	2 (2) 30 35	, y	007	450	%	. ~
¥ 00 €	L (a) -16°,	-12', -8', -5', -2',	0	2,4			اد							) e	١٩	, %
SCHEDILES	P (a) 16°.	200, 250, 300, 350,	004								Q (a) #0- 42 4	4	۲	10	3	ì

807

ж (в) -10°, -5°,

r (a) 16º

TABLE V (CONTINUED)

TEST ANES 6 x 6 509 PRESSURE DATASET COLLATION SHEET

DELTA WING ORBITER DATA - IN PRESENCE OF STRAIGHT WING BOOSTER

PRETEST POSTTEST

DESTINATION   SECTION			TOO ST	GFO	SCEO.	PARAMET	PARAMETER/VALUES				l	-	<u> </u>	-	•
The control of the	DATASET IDENTIFIER	CONFIGURATION	SECTION	CONFIG	$\vdash$					0.9		-	0	4	•
1.05   1.05	AXBEL	BSW13V10/B1W3AV1TT	BODY	1	-			5	12	28	&	-		_	
1) 7, THEEM, R  2) 7, 10°, 10°, 10°, 10°, 10°, 10°, 10°, 10°	LCCARO		UPPER WING	2	1						7	+	4	_	
COTTON   1   1   1   1   1   1   1   1   1	DAXW26		LOWER WING	2				1			1	+		+	-
Control Strip   Vert.   2   4   4   4   4   4   4   4   4   4	DAXV21		INBOARD VERT. STAB.	2				+	#	-	7	7	+	4	
UPPER WING   2	DAXV26		CUTBOARD VERT. STAB.	2	<b>+</b>			1	-	-	-	-	-	+	
LOWER WING   2	DAXB22		BODY	1				_	×	32	7	十	2	$\downarrow$	
THEORIEN VERT.   2	DAXW22		UPPER WING	2				$\dashv$	+	+	+	#	$\frac{1}{1}$	$\downarrow$	
1) X, THETA, R  2) X, THETA, R  3) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R	DAXW27		LOWER WING	1				+	#		1	#	_	4	
1) X, THETA, R  2) X, THETA, R  2) X, THETA, R  3) S, 40°, 45°, 50°, 50°, 50°, 50°, 50°, 50°, 50°, 5	DAXV22		INBOARD VERT. STAB.					1			1	7		$\frac{1}{1}$	
1) X, THETA, R  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  1 (P) -10°, -5°, 0°, 5°, 10°  2 (P) -10°, -5°, 0°, 5°, 10°  3 (P) -10°, -5°, 0°, 5°, 10°  4 (P) -10°, -5°, 0°, 5°, 10°  5 (P) -10°, -5°, 0°, 5°, 10°  6 (P) -10°, -5°, 0°, 5°, 10°  7 (P) -10°, -5°, 0°, 5°, 10°  8 (P) -10°, -5°, 0°, 5°, 10°  8 (P) -10°, -5°, 0°, 5°, 10°  8 (P) -10°, -5°, 0°, 5°, 10°  8 (P) -10°, -5°, 0°, 5°, 10°  8 (P) -10°, -5°, 0°, 5°, 10°  9 (P) -10°, -5°, 0°,	DAXV27		OUTBOKED VERT.		÷ +				-	-	-	-	<u>-</u>	4	
1) X, THETA, R  2) X, THETA, R  2) X, THETA, R  2) X, THETA, R  2) X, THETA, R  2) X, THETA, R  2) X, THETA, R  2) X, THETA, R  3) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  4) X, THETA, R  5) X, THETA, R  5) X, THETA, R  5) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R  6) X, THETA, R	DAXB23	•	BODY		<del>6  </del>				7	o <sub>r</sub>	8	$\dashv$	<u></u>	-	
1) X, THETA, R  2) Y(B/2, X/C, Z/C  1) Y(B/2, X/C, Z/C  2) Y(B/2, X/C, Z/C  2) Y(B/2, X/C, Z/C  3) Y(B/2, Z/C  4) Y(B/2, Z/C  4) Y(B/2, Z/C  5) Y(B/2, Z/C  6) Y(B/2, Z/C  7) Y(B/2, Z/C  6) Y(B/2, Z/C  7) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  1) Y(B/2, Z/C  2) Y(B/2, Z/C  2) Y(B/2, Z/C  3) Y(B/2, Z/C  4) Y(B/2, Z/C  5) Y(B/2, Z/C  6) Y(B/2, Z/C  6) Y(B/2, Z/C  6) Y(B/2, Z/C  6) Y(B/2, Z/C  7) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  8) Y(B/2, Z/C  9) Y(B/2, Z/C  1) Y(B/2, Z/C  2) Y(B/2,	DAXW23		UPPER WING	2					+		7	+	$\frac{1}{4}$	4	
1) X, THETA, R  2) X, THETA, R  2) X, THETA, R  2) X, THETA, R  2) X, THETA, R  30 X, TA, THETA, R  4 X, TA, TA, THETA, R  4 X, TA, THETA, R  4 X, TA, THETA, R  4 X, TA, THETA, R  5 X, TA, THETA, R  5 X, TA, THETA, R  5 X, TA, THETA, R  5 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  6 X, TA, THETA, R  7 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA, THETA, R  8 X, TA,	DAXW28		LOWER WING					4				#	4	4	
1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  1 (a) -16', -12', -8', -5', -2', 0', 2', 4', 6', 8', 12'  1 (a) -16', -12', -8', -5', -2', 0', 2', 4', 6', 8', 12'  1 (a) 16', 20', 25', 30', 35', 40°  1 (a) 16', 20', 25', 30', 35', 40°  1 (a) 16', 20', 25', 30', 35', 40°  2 (a) 40', 45', 50', 50', 50', 50', 50', 50', 50', 5	DAXV23		IN BOARD VERT.					$\dashv$	$\dashv$			#	+	$\frac{1}{1}$	
1) X, THETA, R  2) X(B/2, X/C, Z/C  L (a) -16', -12', -8', -5', -2', 0', 8', 12'  L (a) 16', 20', 25', 30', 35', 40°  T (a) 16', 20', 25', 30'  T (a) 16', 20', 25', 30'  T (a) 16', 20', 55', 30'  T (b) -100', -5', 00', 5', 10°  B (b) -100', -5', 00', 5', 10°  B (b) -100', -5', 00', 5', 10°  B (b) -100', -5', 00', 5', 10°  B (b) -100', -5', 00', 5', 10°  B (c) -100', -5', 00', 5',	AXV28		CUTBOARD VERT.		<b>+</b>			-		-	-	-	╣	+	
1) X, THETA, R  2) Y(B/2, X/C, Z/C  L (a) -16', -12', -8', -5', -2', 0', 2', \( \frac{4}{4} \), \( \frac{6}{4} \), \( \frac{8}{4} \), \( \frac{1}{												1	+	$\dashv$	
1) X, THETA, R  1) X, THETA, R  L (a) -16', -12', -8', -5', -2', 0', 2', 40', 45', 50', 55'  L (a) -16', -12', -8', -5', -2', 0', 6', 8', 12'  F (a) 16', 200', 25', 300', 350', 400'  F (a) 16', 200', 25', 30', 35', 400'  F (a) 16', 200', 25', 30', 35', 400'  F (b) -10', -5', 0', 5', 10'  B (b) -10', -5', 0', 5', 10'  B (b) -10', -5', 0', 5', 10'  B (c) -12', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 5', 10'  B (d) -10', -5', 0', 10'  B (d) -10', -5', 10'  B (d) -10', -5', 10'  B (d) -10', -5', 10'  B (d) -10', -5', 10'  B (d) -10', -5', 10'  B (d) -10', -5', 10'  B (d) -10', -5', 10'  B (d) -10', -5', 10'  B (d) -10', -5', 10'  B (d) -10', -5', 10'  B (d) -10', -5', 10'  B (d) -10								$\dashv$				7	+	4	
1) X, THETA, R  1) X, THETA, R  L (a) 16', -12', -8', -5', -2', 0', 2', 4', 6', 8', 12' R (a) 30', 35', 40', 45', 50', 55'  L (a) 16', 200', 25', 30', 35', 40'  T (a) 16', 200', 25', 30'  T (a) 16', 200', 25', 30'  T (a) 16', 200', 55', 10'  T (b) -100', -5', 00', 5', 10'  STRAIGHT WING ORB  NOTE: A														$\dashv$	_
1) X, THETA, R  1) X, THETA, R  1) X, THETA, R  10N 2) Y(B/2, X/C, Z/C  1 (a) -16', -12', -8', -5', -2', 0', 2', 4', 6', 8', 12'  1 (a) -16', 20', 25', 30', 35', 40'  1 (a) 16', 20', 25', 30', 35', 40'  1 (a) 16', 20', 25', 30'  1 (b) -10', -5', 0', 5', 10'  1 (c) -10', -5', 0', 5', 10'  1 (d) -10', -5', 0', 5', 10'  1 (e) -10', -5', 0', 5', 10'  1 (f) -10', -5', 0', 5', 10'  1 (g) -10', -5', 0', 5', 10'  1 (h) -10', -5', 0', 5', 10'  1 (h) -10', -5', 0', 5', 10'  1 (h) -10', -5', 0', 5', 10'  1 (h) -10', -5', 0', 5', 10'  2 (h) -10', -5', 0', 5', 10'  3 (h) -10', -5', 0', 5', 10'  3 (h) -10', -5', 0', 5', 10'  3 (h) -10', -5', 0', 5', 10'  3 (h) -10', -5', 0', 5', 10'  3 (h) -10', -5', 0', 5', 10'  3 (h) -10', -5', 0', 5', 10'  3 (h) -10', -5', 0', 5', 10'  3 (h) -10', -5', 0', 5', 10'  3 (h) -10', -5', 0', 5', 10'  3 (h) -10', -5', 0', 5', 10'  4 (a) -10', -5', 0', 10'  5 (a) -12', -5', 0', 10'  5 (a) -12', -5', 0', 10'  6 (a) -12', -5', 0', 10'  7 (a) -10', -5', 0', 10'  808													_	4	
1) X, THETA, R  2) Y(B/2, X/C, Z/C  L (a) -16', -12', -8', -5', -2', 0', 2', 4', 6', 8', 12'  L (a) -16', -12', -8', -5', -2', 0', 2', 40', 6', 8', 12'  F (a) 16', 20', 25', 30', 35', 40'  T (a) 16', 20', 25', 30'  T (a) 16', 20', 55', 10'  I (b) -10', -5', 0', 5', 10'  STRAIGHT WING ORB  BOS  NR														-	
1. (a) -16', -12', -8', -5', -2', 0', 2', 4', 6', 8', 12'	FOWETRY	4	R									-		1	
L (a) -16', -12', -8', -5', -2', 0', 2', \( \frac{1}{4}\), \( \frac{1}{6}\), \( \frac{1}{2}\), \( \frac{1}{4}\), \( \frac{1}{2}\), \( \frac{1}{4}\), \( \frac{1}{2}\), \( \frac{1}{4}\), \( \frac{1}{2}\), \( \frac{1}{4}\), \( \frac{1}{2}\), \( \frac{1}{4}\), \( \frac{1}{2}\), \( \fr	ONFIGUR		ي (د	ď	ď	ŀ	o			l °			0		
F(a) 16', 20', 25', 30', 35', 40'  T(a) 16', 20', 25', 30'  T(a) 16', 20', 25', 30'  T(a) 16', 20', 55', 30'  T(a) 16', 20', 55', 10'  STRAIGHT WING ORB  BOS  BOS	9		-8', -5', -2	, o	, 7	8	77			e R		. 1	2		
10, 50, 100 STRAIGHT WING GD/C GD/C DELTA WING ORB NR 808	CHEDULI		o, 30°, 35°,	004						3 3	- I_	_1	_ 4 `		
STRAIGHT WING GD/C GD/C DELTA WING ORB NR 808		T (a) 16', 20'	8								-1			1	
SIKAIGHI WING GD/C GD/C GD/C DELTA WING ORB NR 808	•	# (p) -10°, -5°	00, 50,					•							
DELTA WING ORB			•									8 - H	A 1 GH	Z <b>X</b>	
				•								DEL	•		18 I TER
						808						Œ			

TABLE V (CONTINUED)

TEST AND 6 x 6 509 PRESSURE DATASET COLLATION SHEET

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1129 C-2- 38

STRAIGHT WING ORBITER ALONE DATA

				19	H	PADAMETER/VALUES	AV/	18	ē			¥	MACH NUMBERS	IBE RS		$\prod$
		MODEL	GEO.	מעט	4	74.7	7			Γ	ł	L	L			
DATASET	CONFIGURATION	SECTION	CONFIG.	8	8	_			RUNS	0.6	6.9	15	1.2 1.5	<u>ہ</u>		
	2000 0000 0000	RODY	-	-	و و				5	69	88	61	99	8		
SACEST	POWIUMIZAY			╡.	+	H			-	-	-	_	-	_		
SAXW51		UPPER WING	2	‡	$\pm$	+			Ŧ		$\pm$	上	L	上		
8AXW56		LOWER WING	8	1	_	4			7	+	$\pm$	$\pm$	‡	‡	brack	
SAXH51		UPPER HORIZ.	2	_	4	_			$\dashv$	+	$\pm$	$\pm$	#	+		
SAXB56		LOWER HORIZ.	2			_			$\exists$	1	$\pm$	士	‡	<b>†</b>		
SATVS		VERTICAL TAIL	2	=		_			-	-	-		1	4	_	
8AXB52		BODY	1	52	<u>F.</u>	$\dashv$			+	7		2	4	و .	1	
SAXW52		· UPPER WING	2	1	<del> </del>	$\dashv$	1		$\pm$	$\pm$	1	$\pm$	‡	+	_	
SAXWS7		LOWER WING	2			$\dashv$	$\perp$			1	$\pm$	1	#	$\ddagger$	1	
SAXH52		UPPER HORIZ.	2		_	$\dashv$	_			1	$\perp$	$\pm$	$\downarrow$	‡	1	
SAXH57		LOWER HORIZ. TAIL	8		$\dashv$	-	_		$\frac{1}{2}$	╁	士	+	#	‡	_	
SAXVS2		VERTICAL TAIL	2	-	-	_			$\frac{1}{2}$	-			<u> </u>	-	1	
SAXB53		BODY	-	৪	Z	$\dashv$	$\downarrow$		1	2	2		2	<u></u>	_ _	$\perp$
SAXW53		UPPER WING	2	$\exists$	$\exists$	-	_		1	$\pm$	+	#	1	‡	1	
SAXW58		LOWER WING	2		4	$\dashv$	_		$\pm$	_	$\pm$	#	#	‡	$\downarrow$	1
SAXH53		UPPER HORIZ.	2		_	+	_			1	$\downarrow$	#	7	+	$\perp$	_
SAXH58		LOWER HORIZ. TAIL	2		#	+	$\downarrow$	_	$\pm$	#	士	#	7	+	1	$oldsymbol{\perp}$
8AXV53		VERTICAL TAIL	2	-	-	+	$\downarrow$	_	1	-   ;		1	Т	1	+	$\downarrow$
SAXB54		BODY	-	0	° .	+	-	$\downarrow$	士	<b>8</b>	<u></u>	<u>ء</u> ا	<u> </u>	2 -	_	1
SAXWSI		UPPER WING	2		7	$\dashv$	4	_			1	4	-	-	$\frac{1}{2}$	4
CEOMETRY	1) X, THETA,	æ														
CONFIGURATION	2) I/(B/2),			- 1	- [		١		1	'		1			000	- t
•	L (a) -16°, -	6.	%	20, 10	8	8	22	İ	1	- 1	30,	. P.		*0 **		-1 -
SCHEDULES		25°, 30°, 35°,	100g						İ	2 0.	~  ~	٠.	alo.		~  _	-1
,		20°, 25°, 30°				l	İ				. 1	-1		_	ا۔	1
•	H (B) -10°,	-50, 00, 50, 100			٠				•							
		•	.:		•										•	

GD/C DELTA WING ORBITER NR DR#1129 C-2-39

TABLE V (CONTINUED)

PRESSURE DATASET COLLATION SHEET TEST AMES 6x6 509

STRAIGHT WING ORBITER ALCHE DATA (Continued)

PRETEST POSTTEST

88 8	B B B B B B B B B B B B B B B B B B B	CONFIGURATION SECTION
	8°, 12°  8 (a) 10°, 45°, 50°, 55°  8 (a) -12°, -5°, 0°, 4°, 12°  8 (a) -12°, -5°, 0°, 4°, 12°	RENTOHLEYS LOWER WING 2 Q 00
8	89 88 87 86 85  8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	UPPE
8	89 88 87 86 85  80, 120 R (a) 300, 350, 400, 450, 500, 550  8 (a) 400, 450, 500, 550  8 (a) 400, 450, 500, 650 650	LOWER HORIZ. 2
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° 8 (a) 40°, 45°, 50°, 55° 8 (a) 40°, 45°, 50°, 55° 60°, 65° 65° 65° 65° 65° 65° 65° 65° 65° 65°	2
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° 60°, 65° 8 (a) -12°, -5°, 0°, 4°, 12°	BODY 1 T 0°
	8°, 12° R(x) 30°, 35°, 40°, 45°, 50°, 55° 60° 65° 8 (x) -12°, -5°, 0°, 4°, 12° 8 (x) -12°, -5°, 0°, 4°, 12°	UPPER WING 2
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° 60° 65° 65° 8 (a) -12°, -5°, 0°, 4°, 12°	LOWER WING 2
	8°, 12° R (æ) 30°, 35°, 40°, 45°, 55° 60°, 65° 65° 65° 65° 65° 65° 65° 65° 65° 65°	UPPER HORIZ. 2
	8°, 12° R(x) 30°, 35°, 40°, 45°, 50°, 55° 60° 65° 8 (a) -12°, -5°, 0°, 4°, 12° 8 (a) -12°, -5°, 0°, 4°, 12°	LOWER HORIZ. 2
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° q (a) 40°, 45°, 50°, 55° 60°, 65° 8 (a) -12°, -5°, 0°, 4°, 12°	VERTICAL TAIL 2 t
	8°, 12° R (x) 30°, 35°, 40°, 45°, 55° 60°, 65° 65° 65° 65° 65° 65° 65° 65° 65° 65°	
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° 60° 65° 8 (a) -12°, -5°, 0°, 4°, 12° 8 (a) -12°, -5°, 0°, 4°, 12°	
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° 9°, 65° 65° 65° 65° 65° 65° 65° 65° 65° 65°	
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° 9°, 60°, 65° 8 (a) -12°, -5°, 0°, 4°, 12° 8 (a) -12°, -5°, 0°, 4°, 12°	
	8°, 12° R (a) 30°, 35°, 40°, 45°, 55° 60°, 55° 60°, 65° 8 (a) -12°, -5°, 0°, 4°, 12° 8 (a) -12°, -5°, 0°, 4°, 12°	
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° 60°, 65° 8 (a) -12°, -5°, 0°, 4°, 12° 8 (a) -12°, -5°, 0°, 4°, 12°	
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° q (a) 40°, 45°, 50°, 55°, 60°, 65° 8 (a) -12°, -5°, 0°, 4°, 12°	
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° 9°, 60°, 65° 8 (a) -12°, -5°, 0°, 4°, 12° 8 (a) -12°, -5°, 0°, 4°, 12°	
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° q (a) 40°, 45°, 50°, 55°, 60°, 65° 8 (a) -12°, -5°, 0°, 4°, 12°	•
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° 9°, 60°, 65° 8°° 8°° 8°° 8°° 8°° 8°° 8°° 8°° 8°° 8	
	8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55° 9 (a) 40°, 45°, 50°, 55°, 60°, 65° 8 (a) -12°, -5°, 0°, 4°, 12°	
	40°, 45°, 50°, 55°, 60°, 65°, 12°, -5°, 0°, 4°, 12°, -5°, 0°, 4°, 12°, 12°, 12°, 12°, 12°, 12°, 12°, 12	-8°, -5°, -2°, 0°, 2°, 4°,
8°, 12° R (a) 30°, 35°, 40°, 45°, 50°,	-120, -50, 00, 40, 120	300, 350, 400
8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 90°, 40°, 45°, 50°, 50°, 50°, 50°, 50°, 50°, 50°, 5		250 300
8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 90°, 40°, 45°, 50°, 55°, 60°, 40°, 45°, 50°, 55°, 60°, 40°, 12°, 12°, 12°, 12°, 12°, 12°, 12°, 12		= (A) -100 -50 00 50 100

ORIGINAL PAGE IS OF POOR QUALITY

TABLE V (CONTINUED)

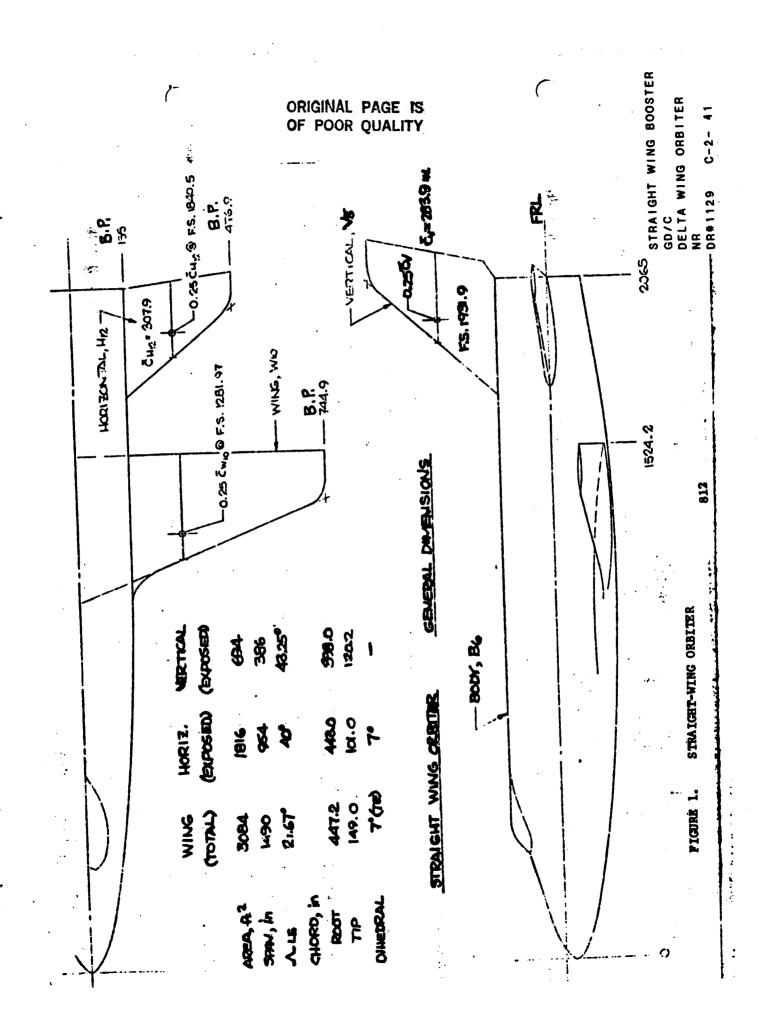
## STRAIGHT WING BOOSTER GD/C DELTA WING ORBITER NR DR#1129 C-2- 40

STRAIGHT WING ORBITER DATA - IN PRESENCE OF STRAIGHT WING BOOSTER

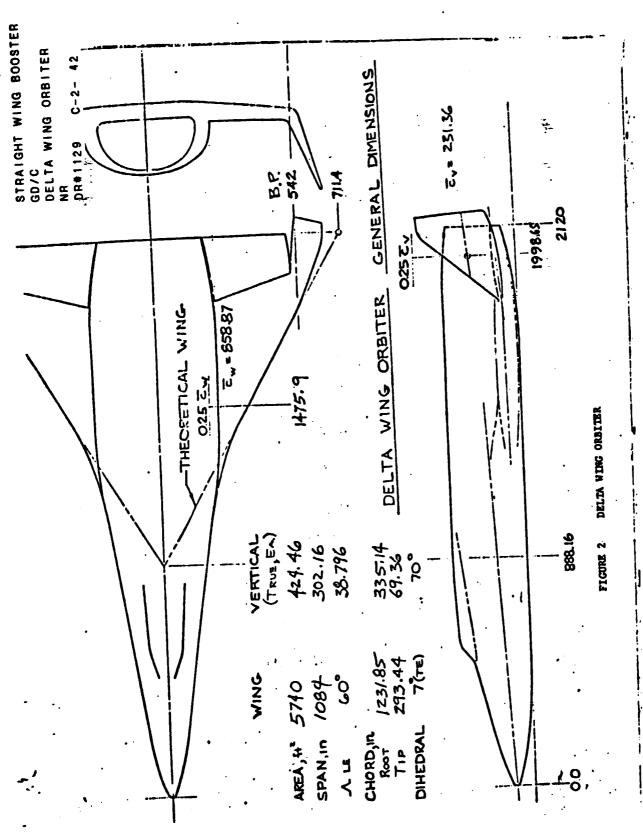
						ŀ			T	_		3	MACH NUMBERS	E KS		I
			MODEL	GEO.	Y N	┥	AK AME	PAKAMETER/ VALUES	T	_	L	г				
IDENTIFIER	CONFIGURATION	<u> </u>	SECTION	CONFIG.	۵	В			爰	ᆈ	0.60.9	1.2	1.5	200		
24.83	P6W10H12V5/B1	WANTT	BODY	7	13	00				5	25 <del>*</del> 24	23	8	ส		
SANAS	-		HPPER WING	2		_			-		7	$\dashv$	$\frac{1}{4}$	$\pm$		
Year of			LOWER WING	2	E						$\dashv$	7		_		
SAMESO			UPPER HORIZ.	2	E	_					$\exists$	4	#	1		
YC DAY'S			LOWER HORIZ.	2	E						$\dashv$	$\dashv$	_	$\dashv$		
SAXV31			VERTICAL TAIL	2	E	-			1		+	-	-			
SAXB32			BODY	7	20	E	+			ଷ	67	82	17	9 .	1	
SAXW32			UPPER WING	٦.	-	<del>-</del>	-				7	7	+	$^{+}$	$\perp$	
SAXW36			LOWER WING	2			-		-		7	7	$\downarrow$	+		1
SAXH 32			UPPER HORIZ. TAIL	2			-				4	+	+	+	1	
SAXH36	-		TAIL TAIL	2			$\dashv$				-	-	+	#	1	$\downarrow$
SAXV32			VERTICAL TAIL	2	+	-	_		+	-		-	-	1	$\perp$	
											-	$\dashv$	-	_	$\downarrow$	1
						_	_					•		_		
						T	$\vdash$									
							-					_	_			
							+			<u> </u>	├	_	_		_	
				1		1	+			╁	╁	╀	-	-	_	_
					·		+		+	$\dagger$	+	+	+	+	L	$oldsymbol{ol{ol{ol}}}}}}}}}}}}}}}}}$
					_		$\dashv$			$\dagger$	+	+	+	+	$\downarrow$	$\downarrow$
											-	$\dashv$	$\dashv$	4	_	4
						1	1			*	RUN 2	S USE	RUN 25 USES a SCHEDULE S	HEDDI	S	

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POOR QUALITY

35°, 40°. R (a) 30°. S (a) -12º q (a) 40°, , **°** °0<sub>2</sub>, ( 04, ) L (a) -16°, -12°, -8°, x, THETA, R 1/(B/2), X/C Z/C R (p) -10°, -5° e (a) 16°. T (a) 16 GEOMETRY CONFIGURATION a OR B SCHEDULES

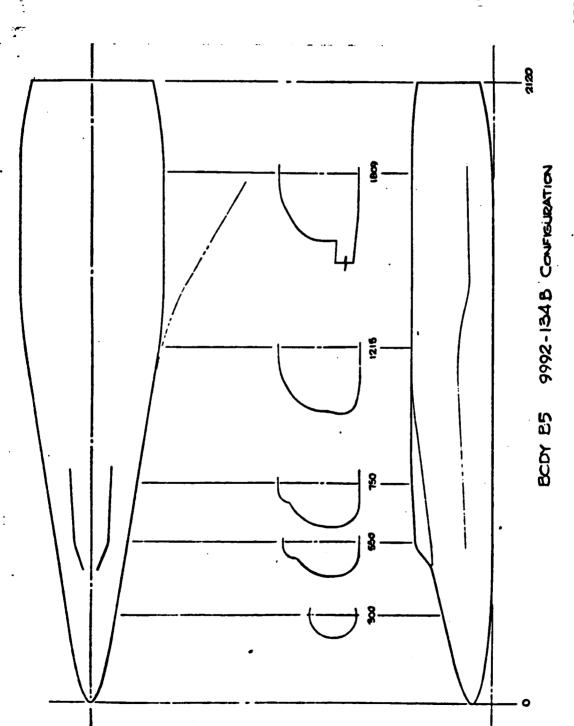






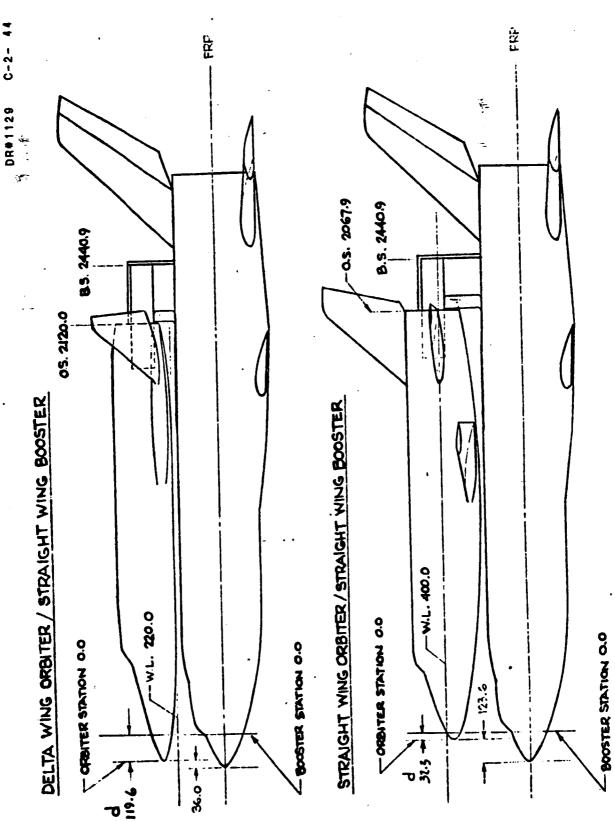
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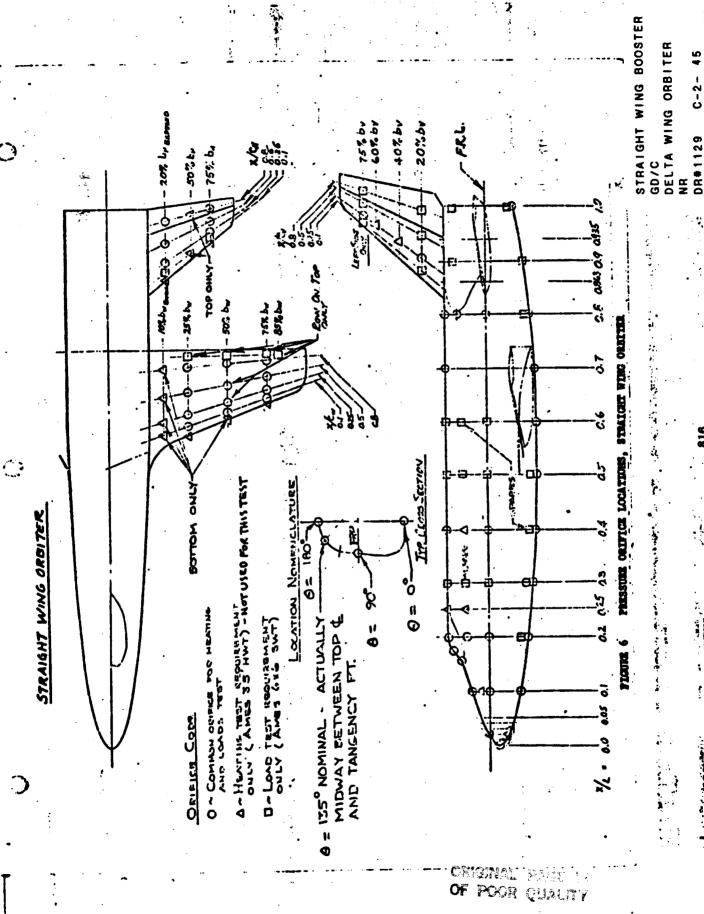
814

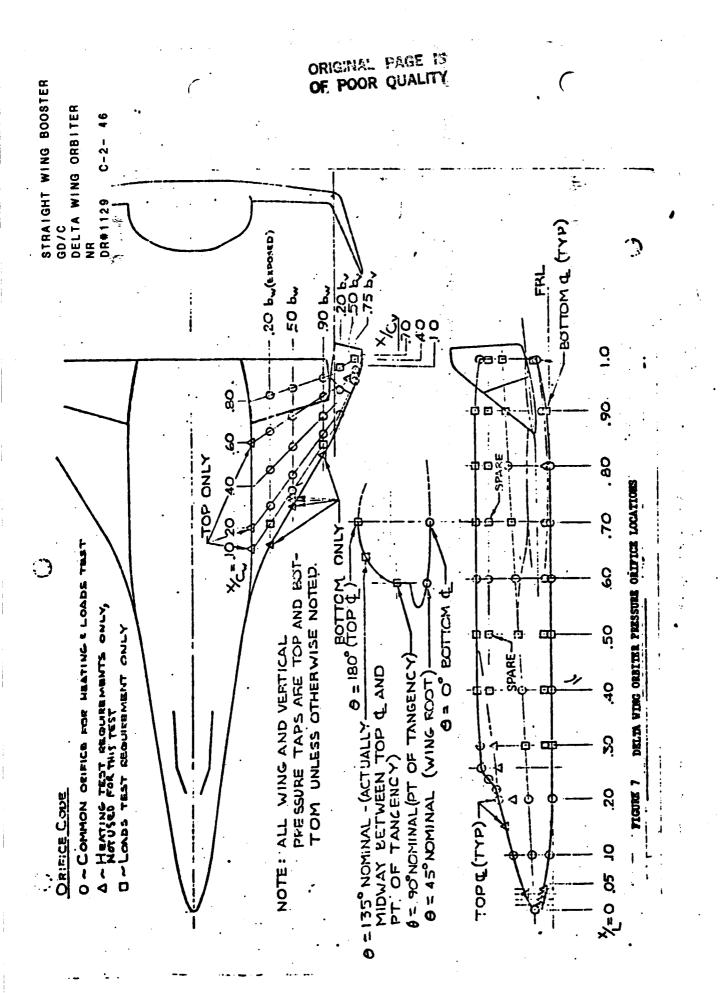
FIGURE 3 DELTA WING ORBITER BODY

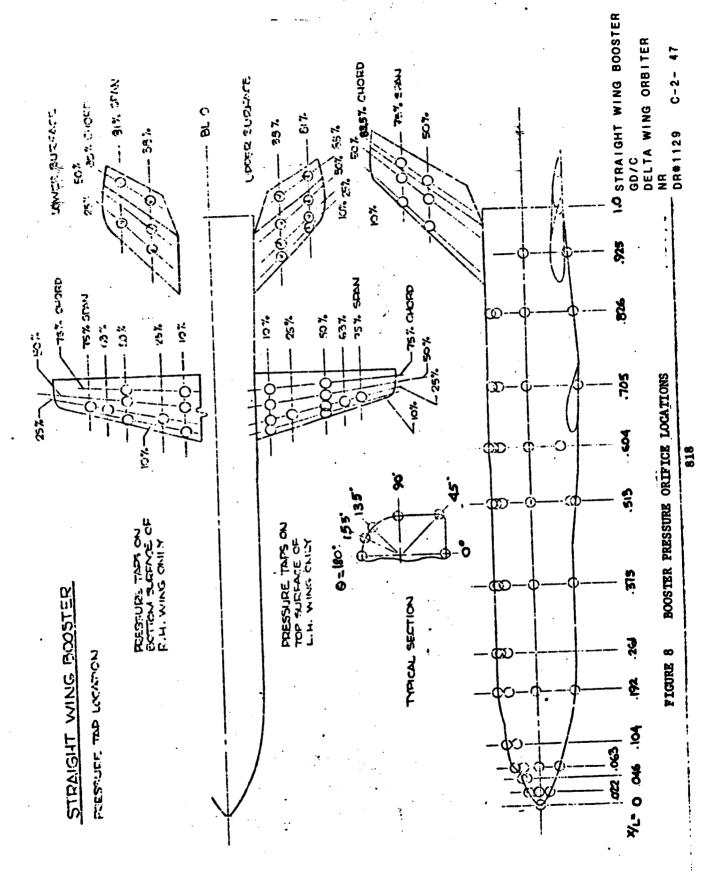


818 LAUNCH CONFIGURATIONS FIGURE 4

.(\_







STRAIGHT WING BOOSTER

UNIQUE CONFIGS. ORBITER GAC

C-2- 48

DR#1136

O POSTTEST

C PRETEST

1/150-SCALB LAURCE CONFIGURATION - NEIRIC AND PRESSURE TANK TEST IN THE AMES  $6^{\circ}$  x  $6^{\circ}$  vind turned COLLATION SUMMARY

DATA SET/RUN NUMBER

TARE 1. TEST ANES 66-561

(IDPVAR(1) IDPVAR(2) MOV MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE 2 MAGRERS RUM 18 Q ព **\*** 67 15 7 43 ደ 8 ង CAC 13 9 1 37 NO. of RUNS 4 CBL PARAMETERS/VALUES 0, 4, 8, 12 CYN 0 0 SCHD. CX 8 0 0 ပ CLM CONFIGURATION 13 (B)2(0)2A6T21 (B)2(0)2AGT2 (B)2(0)2A6T2  $(B)_2(0)_2A_6T_3$ (B)2(0)2A6T3 CA **COEFFICIENTS:** DATA SET LUENTIFIER RBCT 12 RBCT 13 RBCT 14 RBCT 15 RBCT 11

TEST RUN NUMBERS

819

**'21-**

**β** D =

a or 6 SCHEDULES

200

HASA-HSPC-HAP

-A660.

Model dimensions in inches

(a) Dimensions

Figure D.- Conical-Nose Tanks - I2 (1/150 Scale)

STRAIGHT WING BOOSTER TBC UNIQUE CONFIGS. ORBITER GAC DA#1136 C-2- 49

Orreor

120 S

6 - 180

6.247

5.600

4.600

3.267

2,133

1471

TANK STATION 333 200

20

C-2-

**ORIGINAL** 

PRESSURE TAP LOCATIONS (\$ in DEG.)

7.4 p 805.

76. OF 74 PS

TANK STATION

0,90,130,270

6-13

0.800

1.44.1

2.133 3.267

0.333

14-21

OF POOR QUALITY

0,45,90, 135, 180, 225,210,315 0,45,90,135,180,225,270,315 0, 45, 90, 135, 180,225,270,315

0,90,180,270

0, 45, 90,135,180,270

34-39 30-33 22-29

> 4.400 5.000

44-45

45

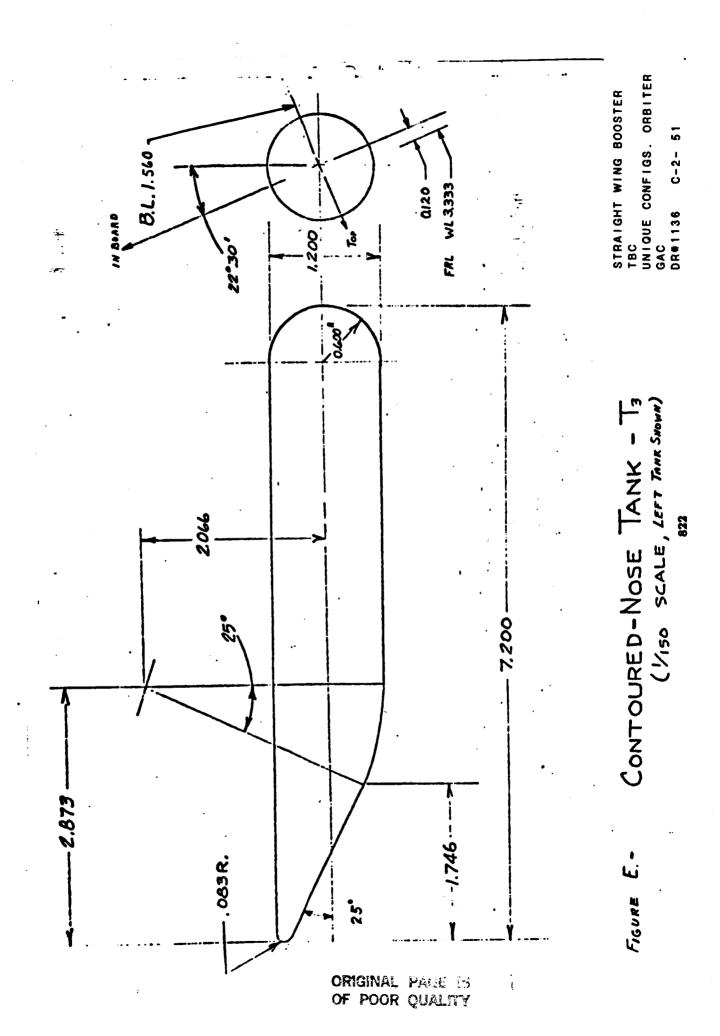
70TAL

4.267

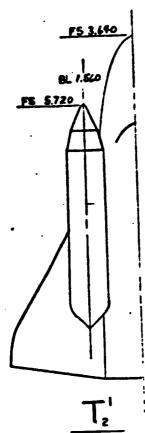
(6) PRESSURE TAP LOCATIONS

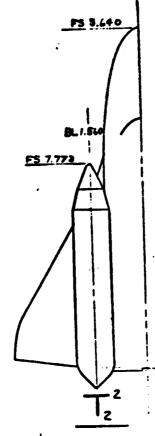
Floure D. - concluded.



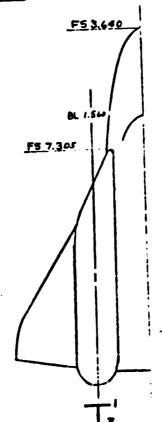


STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1136 C-2- 52





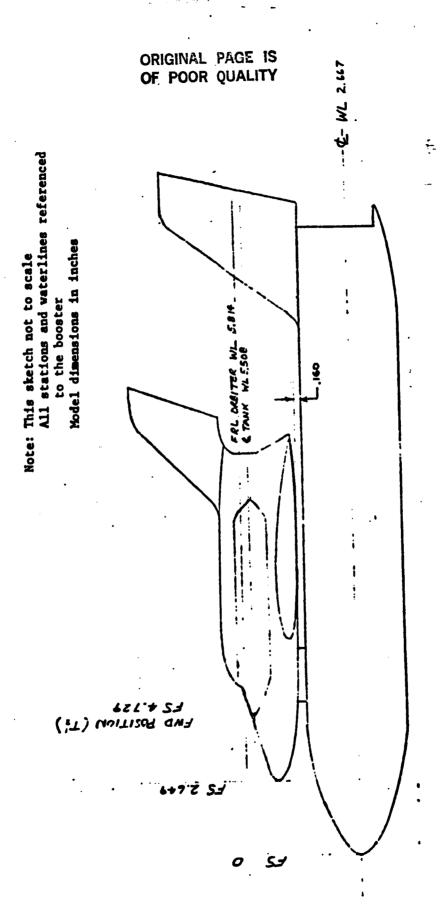
CONICAL NOSE TANK

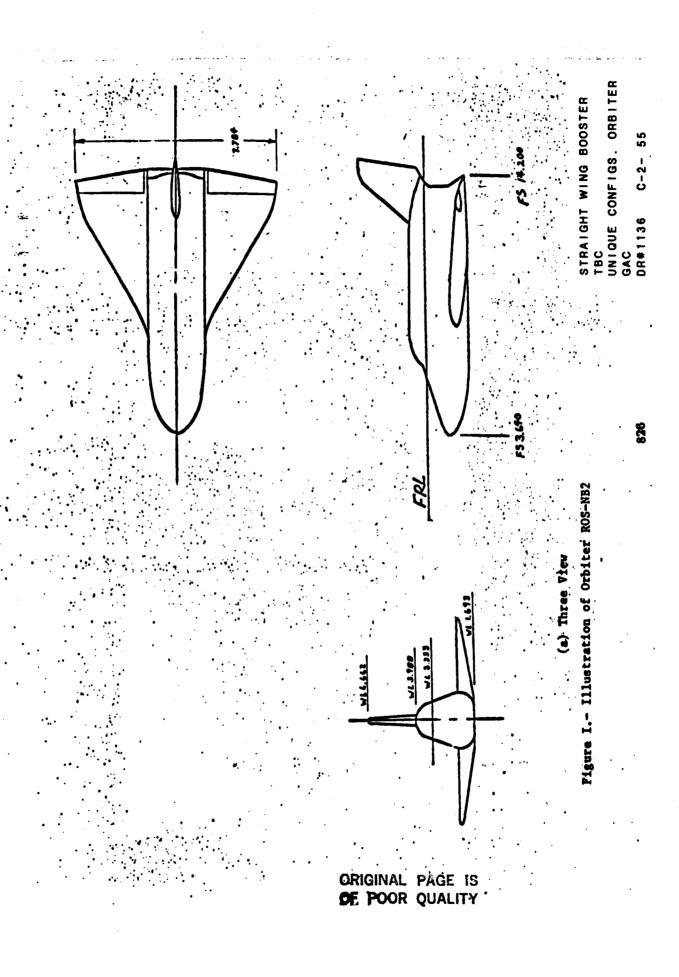


CONTOURED NOSE TANK

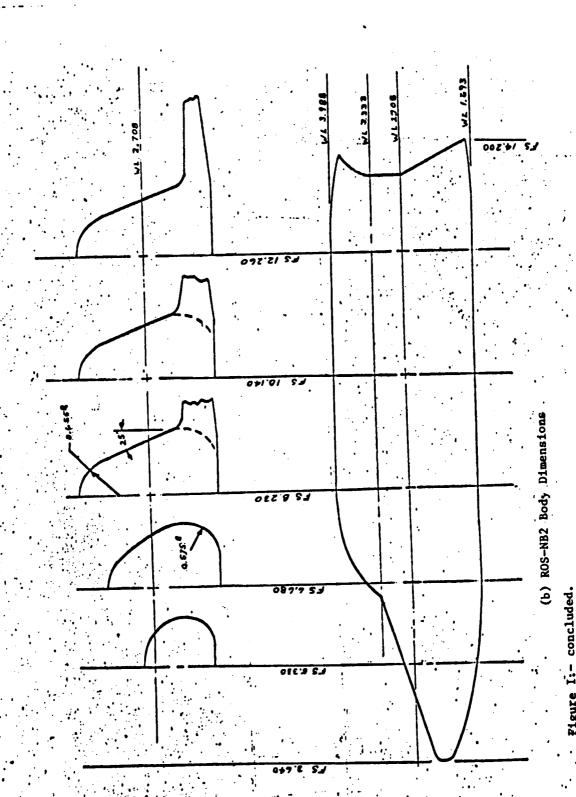
Dimensions in orbiter reference system in inches.

Figure G.- Launch Configuration





C-2- 56



APPENDIX C-3

MODEL FIGURES

LAUNCH HEAT TRANSFER

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TABLE 4

SUB SCHEDULE - MOAD CHACE SHUTTLE
CAL 96" RST

CANARD BOOSIEH
MDAC
DELTA WING ORBITER
MDAC

	· · · · · · · · · · · · · · · · · · ·				DR#11	70	C-3-	
		Tu		Re <sub>∞</sub> ×10 <sup>-6</sup>	Angle	Yaw	COM	
RUN		τ <sub>ν/τ₀</sub>	M <sub>∞</sub>	11:-1	Attack		ELUVOII	
NO.	CONFIGURATION			71.	de g.	deg.	deg.	deg.
, I	Orbiter	.155	11.7	.31	0	0	+10	+10
2	Orbiter Orbiter	156	11.7	.31	25	. 0	_ 0	+10
	Orbiter	.162	12.7	1 2.R	25	0	0	+10
3.	Orbiter	.160	13	1 4.7	25	0	0	+10
	Orbiter	160	13	1 4.7	25	+5	0	+10
5	Orbiter	.157	13	4.5	25	-5	0	+10
7	Orbiter	.157	11.7	.32	45	0	-40	0
8	Orbiter	.162	13	1 4.8	45	1 0	-40	0
9	Orbiter	. 160	13	4.6	45	+5	-140	0
ιó	Orbiter + Straight External Tanks	160	11.8	•35	0	0	0	0
11	Orbiter + Straight External Tunks	.160	1 13	4.6	0	0	0	0
12	Orbiter + Straight External Tanks	.141	7.6	31	0	0	1 0	0
13	Orbiter + Straight External Tanks	334.	1 7.7	2.2	0	0	0	0
14	Orbiter + Straight External Tanks	.312	<u>7</u> .5	9.4	0	. 0.	0	0
15	Orbiter	141	7.6		. 0	0	+10	+10
16	Orbiter	. 328		10.4	0	<u> </u>	+10	+10
17.	Orbiter	.137	7.6	.32	. 80	0	+10	+10
8.	Orbiter	-345	7.6	1- 30-3 —	20	0	+10	+10
19	Orbiter	326	7.5	10.4	25 25	0-	+10	+10
20	Orbiter	139	7.7	2.2	25			+10
21	Orbiter	332	7.5	10.4	25	0	1 - N	+10
22	Orbiter	325 345	7.6	10.3	25	+5_	0	+10
23	Orbiter	324	7.5	10.2	25_	5-	<del>                                     </del>	+10
24	Orbiter	339		27.8	25	0	, o	+10
25 26	Orbiter	137			45_	l ő	-40	0
	Orbiter	340		27.4	45	1 - 5-	-40	l ŏ
27	Orbiter	140		-32	66	ŏ	-40	Ŏ
28	Orbiter	329		10.5	60	0	40	0
29	Orbiter Orbiter	327	7.5	10.4	45	ŏ	-0	1-0
30.   31.	Orbiter + Canted External Tanks	.136	7.6	-32	0	0_	2	0
32	Orbiter + Canted External Tanks	.336		2.3	0	0	2	0
35	Orbiter + Canted External Tanks + Tip Fairing	332	7.7	2.2	0	0	0	0
	Orbiter	.130	7.8	111.4	1 45	0	-40	0
3h 35	Orbiter	1116		10.6	25_	0	- 0	+10
36_	Orbiter	340	7.6	10.4	60	1 0	. 0	+10
37	Mated, Position 2	329	7.6	24.4_	0	0.	0	0
38	Mated, Position 2	.324	7.6	24.0	<u> </u>	0	0	0
39	Materi Ponition 3	330	7.6	24.7	0	0	. 0	0
16-	Mater Position 3 + Canted External Tanks	1.330	7.7	2.4	0	0	0	0
41	Mated, Position 1 + Canted External Tanks	1 .337	1 7.7	2.2_	°	_ 0_	0	0
42	Mated, Position 1	.332	7.7.	2.3	0	0		1 6
h3 -	Mated, Position 1	-139	7.6	24.4	0	0		
44	Mated, Ponition 1	1.324	7.6	24.1	-5	. 0	-   -     -	
45	Mated, Position 1	.322	7.6 7.6	.30_	3	, ŏ		
46	Booster	.134	;  <u>{-</u> -%-	2 1	1 ^	· ∾.	-	-1 :
47	Booster	.327	7.7.	27.1	ö.	1 0		Ö
48	Booster	324		24.6		· 6	- 1 - 0	í
49	Booster	1-,322 166	10.3	37	6	0		ő
50	Mated, Position 1	.166		35	- ŏ-	ő		_ [ o
51	Mated, Ponition 1	1.169		37	ŏ	ŏ	0	Ö
52	Booster	1 .190		10.1	15	0	0	
<u> 53</u>	Booster	166		-37	36	0	0 "	
<u> 5</u> 4	Booster	1.186		9.9	30	0	_ 0	.   0
<u> </u>	Booster	.169		.35	45	5	<u> </u>	] [ ]
56 _	Booster	.161		.87	45_		0	9
57 58	Booster	1.162		5.4	45_		0	
	Boonter	18	11.2	9.7	45		_ 0	
59	Boonter	1.16		. 36	60	_ 0.	0	
61	Booster -	1.16		.87	60		.	1 9
65	Boonter	1.159	10.9	4.6_	60_	9		.   . 9
63	Boonter	166		7.9_	60	. 0		
64	Booster	.160		4.5	60	+5	.   0	1 9
	Booster	.189		9.8	. 50	0		
65	Booster	.10		10.2	55	-0	0	
	1	.18	2 11.2	9.7	15	1 0	l 0	+8
67	Booster	1.18		2.3 j.3	T 60	l	0	+6

....

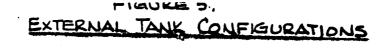
CANARD BOOSTER

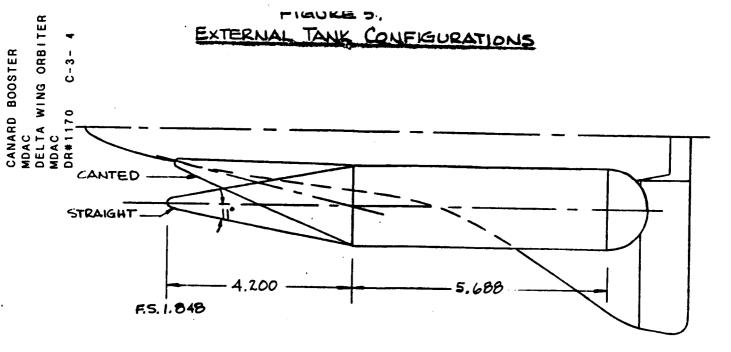
MDAC

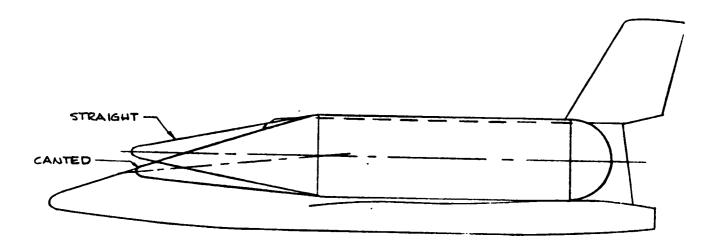
8.2.K DELTA WING ORBITER MDAC DR#1170 C-3-3 -- ×:L 2.500 CANARD BOOSTER FS24350 ß £254'820 ( ) INDICATES GAUGE FS 23,800 30,033 F523220 BL5.220—--BL5.650— S22,400 FS 21000 FS20.650 BL 3240 In data listing the booster instrumentation numbers shown are SIDE VIEW p indicates pressure orifice TOP VIEW £ 404 **95**7.9187 FS16.086 23 25 830 FS13.888 656,5184 -FS12.243 -FS12.901 **ESI3230** FS12,572 FS11595 FS11595 FS11596 **FSI0.367** -09t-684 L28842 - 012,7 27 - 012,7 27 FS12322 FS 10.367 FS 22.400 FS 23300 \$24850 FS 15,086

FIGURE 8 BOOSTER INSTRUMENTATION LOCATIONS

•







CANTED TANK DETAIL -FORWARD COME CANTED 15° AND ROTATED 30° CLOCKWISE LOOKING FORWARD

A-A

FIGURE & MATED CONFIGURATION

832

TABLE 16 TEST LARC 6386/6387 DATA SET/RUN NUMBER

LARC 6386/6387 DATA SET/RUN NUMBER
COLLATION SUMMARY

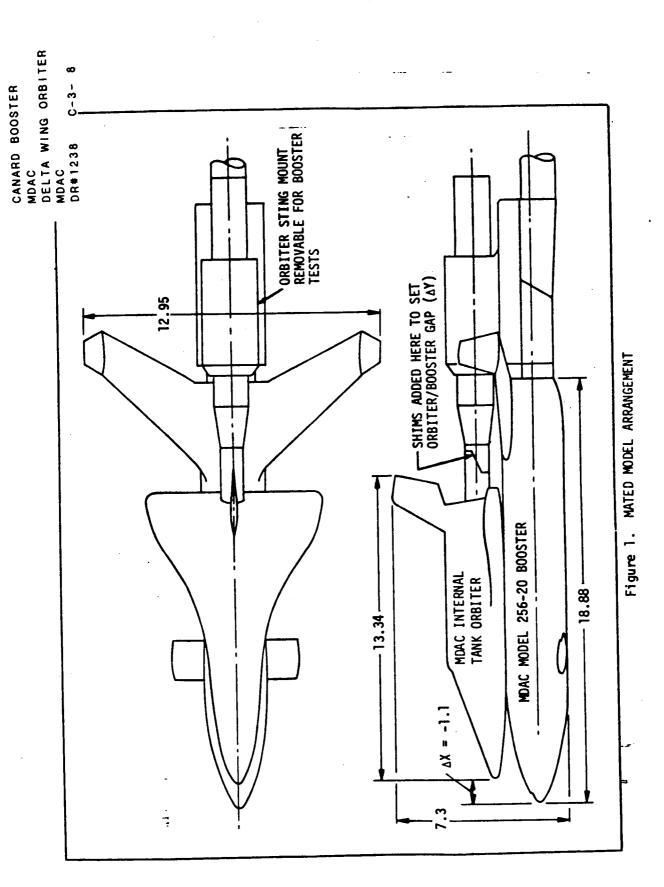
MDAC DELTA WING ORBITER MDAC DR#1238 C-3-6

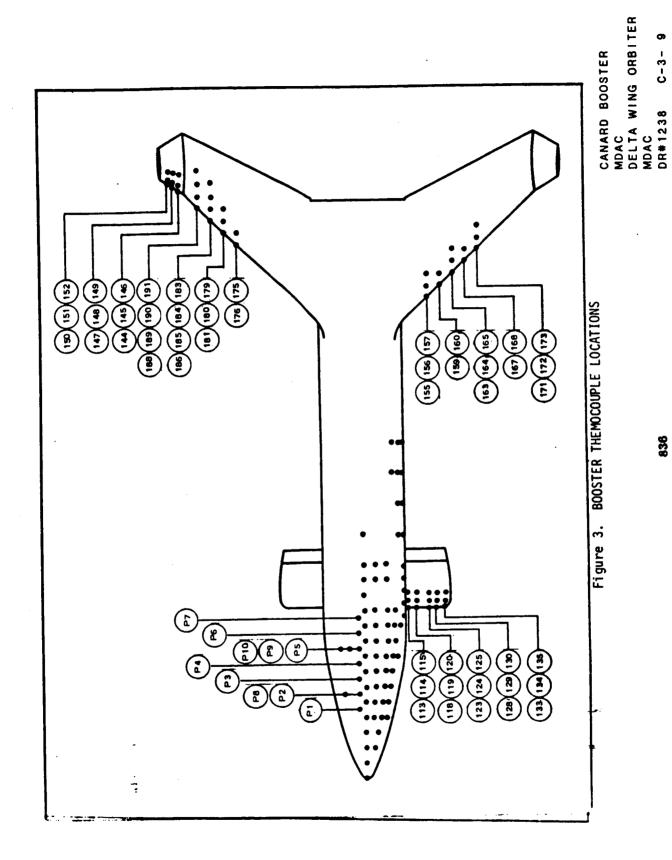
CANARD BOOSTER

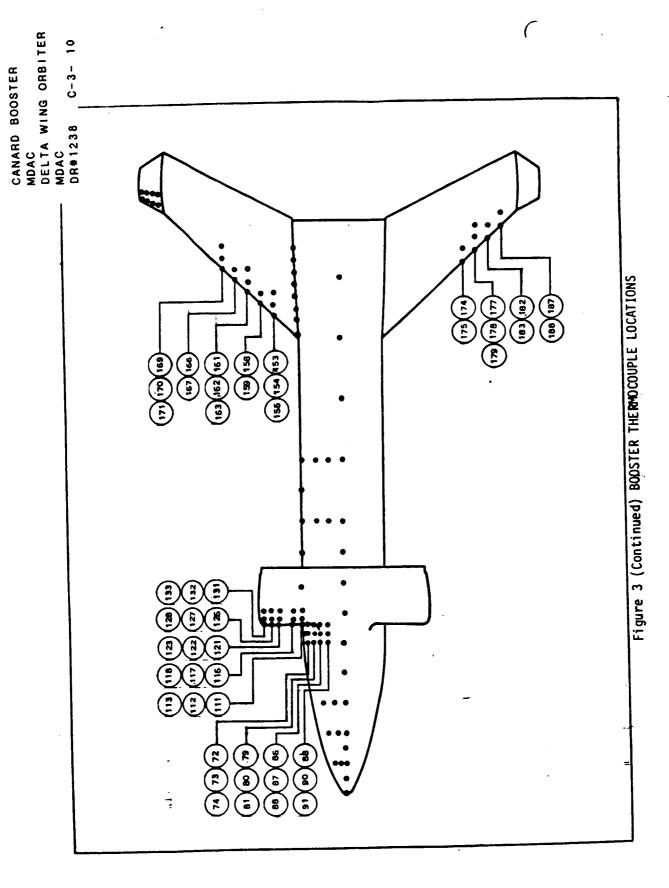
TEST RUN NUMBERS MASA-MSFC-MAF HIDPVAR(1) | IDPVAR(2) | NOV D POSTTEST 3 5-10 29 4-14 5-10 5-10 1-14 29 4-14 7 11-14 1-9 6-4 1-9 1-9 6-4 5-7 2-1 52 4-9 7-5 7 24 5-7 8 25 77 22 72 22 7 22 4-12 1-12 4-12 1-12 5-5 5-8 1-7 J--1 5-5 5-8 1-7 5-5 5-8 1-7 J--4 7-7 1-2 1-7 9 28 23 19 2 23 2 11 ٧ 21 23 19 8 2 ANGLE OF ATTACK - DECREES 75 3 Ņ 3 13 13 NOTE: Run numbers presented are LARC Run No./MSFC Run No. 7 71 15 1-13 8-+ 1-13 1-3 1-8 2-6 1-8 9-5 5-9 1-8 4-8 2-6 4-3 8-4 5-9 5-9 23. 25 25 16 23 30 2 21 2 TEST 63-86 87 × × × × × × Canard Upper Surface Canard Lover Surface Left Outboard Fin CONFIGURATION Booster Body COEPTICIENTS: . <del>-</del>: SCHEDULE DATA SET IDENTIFIED \* TEST AFFTC01 AHTTB01 9 9 œ AHTC10 AHT FO1 AHTF02

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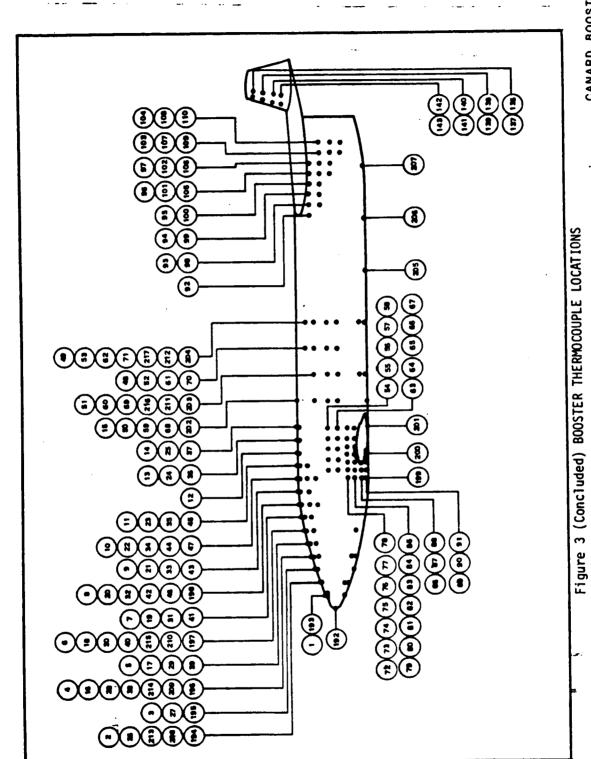
	PRETEST	TTEST		_						T	EST	RU	N N	UMB	ERS								_ 	75.76	Acalica			D BOOSTER	WING ORBITER
	O PRE	D POST				1-14	1-1		1-14	4-14		1-14	41-4 62		7 11-14	29 4-14		1-1	29,4-14		+	<del> </del> -		67	VCN/(2) IDPVAR(2)/NOV	1	.454	CANARD	DELTA W
				5		7	&		7	&		7			7	83		7	29					<b>3</b>	-		•	r	
•				0 :	- 11	6 1-12	21-1 82	п	6 1-12	28 4-12	. 11	6 1-12	28 4-12	11	6 1-12	28 4-12	11 -	6 1-12	28 4-12	11	+	+	<del> </del>	55					
			DEGREES	-1	- :						-			•			•			-	+	+		67				•	
					- 12			12			- 12			- 12			• 12			-1	+	+							
UNIMARY			ATTACK	-5	13			13			13			13			13			13	$\dagger$		-	3	4				
S	•		ANGLE OF	-3	t   -			•	_		-	_		•			-					<del> </del> - -		37	4				
	hun No.				77			11			77			77	_		- 14	<u> </u>	-	7		<u> </u> 							
7702	/MSPC R			7	15	<u>е</u>	6	. 15	<u></u>	<u></u>	15	<u></u>	3	15	<u></u>	<u></u>	15	<u></u>	<u></u>	72	1			1.	1				
COLLA	Run No./MSFC Run No.			-5		9 1-1	30 4-13	-	9 1-13	30 4-13	_	9 1-13	30 4-13	_	9 1-13	30 4-13		9 1-13	30 4-13	+	+	-		25					
l			म्हर्य १३	88.87	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	$\downarrow$	+							
	Run numbers presented are LaRC				rd Pla	rd Fin			r Surface			r Surfece			r Surface			Surface						11 19	4				
	Run numbers		CONFIGURATION		Left Outboard Pin	Right Inboard Fin			L.Wing-Upper Surface			L. Wing-Lover Surface			R.Wing-Upper Surface		>	R.Wing-Lover Surface						,	ENTS:		<del> </del>	e.	
	NOTE:		DATA SET		AHTTEO3	7	2	9 .	AHTW01	2	3	4	2	9	-	8	$\dashv$	Ī	=	12				1	COEFFICIENTS:			ب	٠ ـــــــ

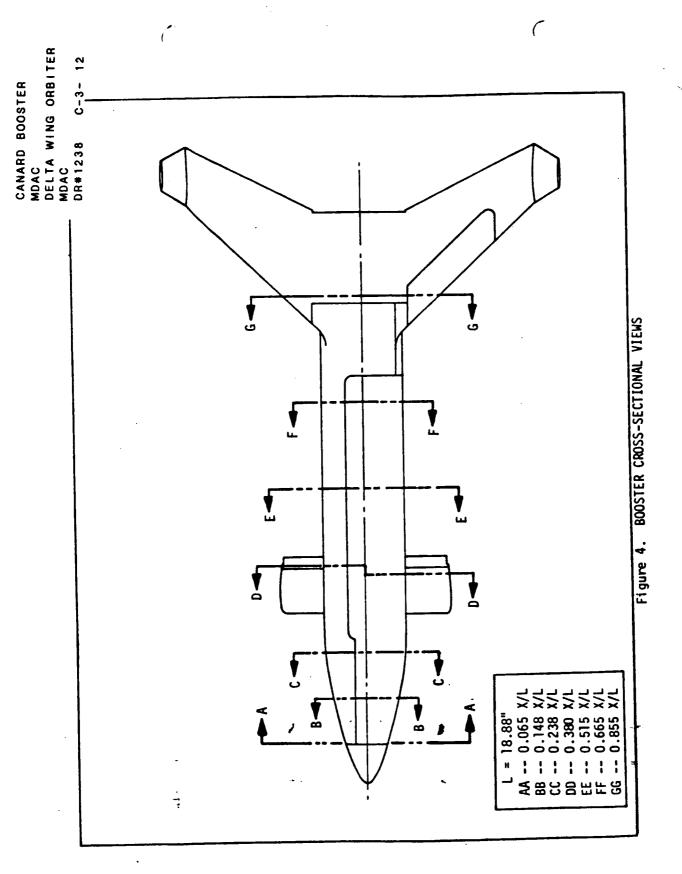


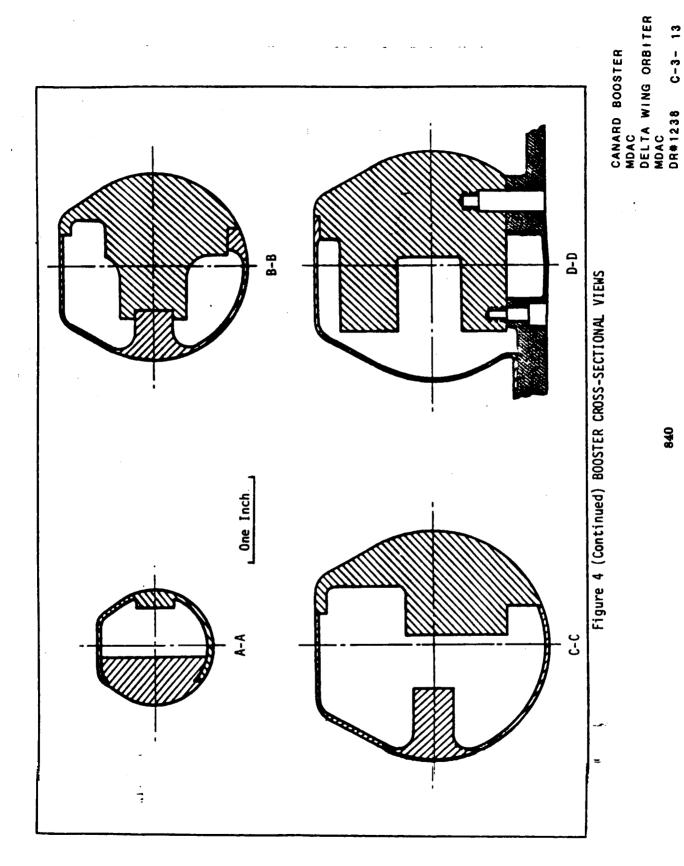


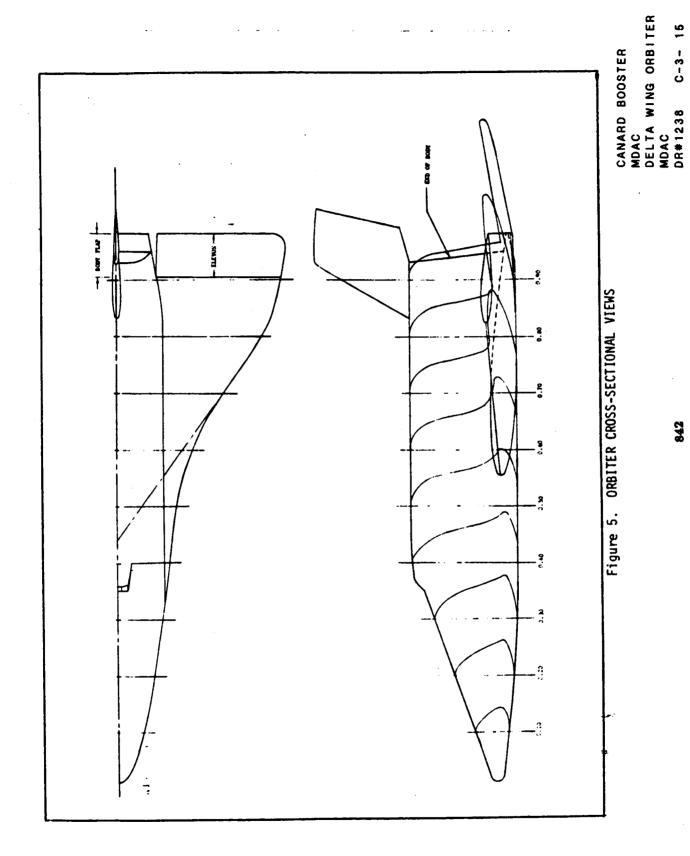


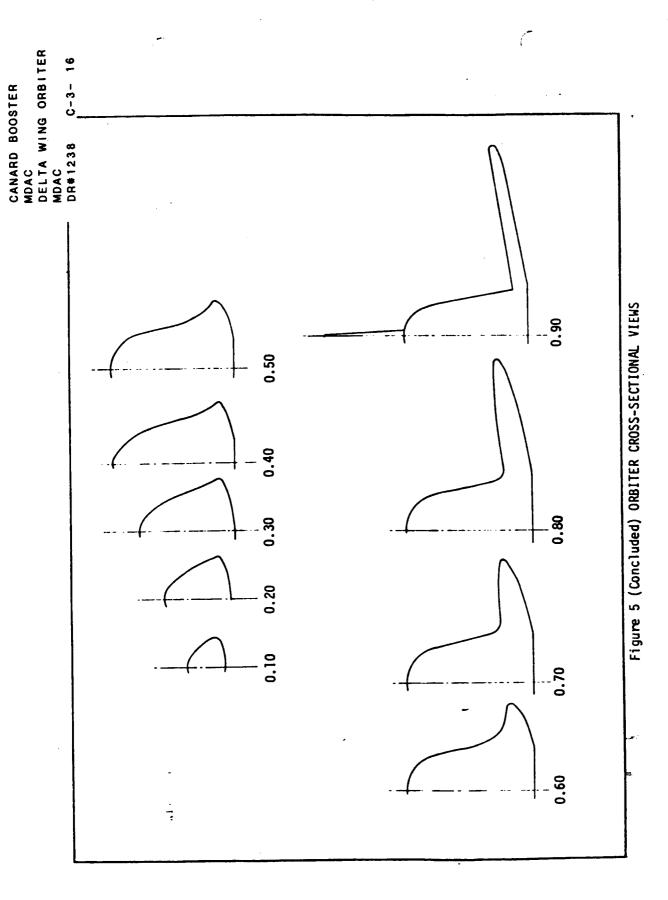












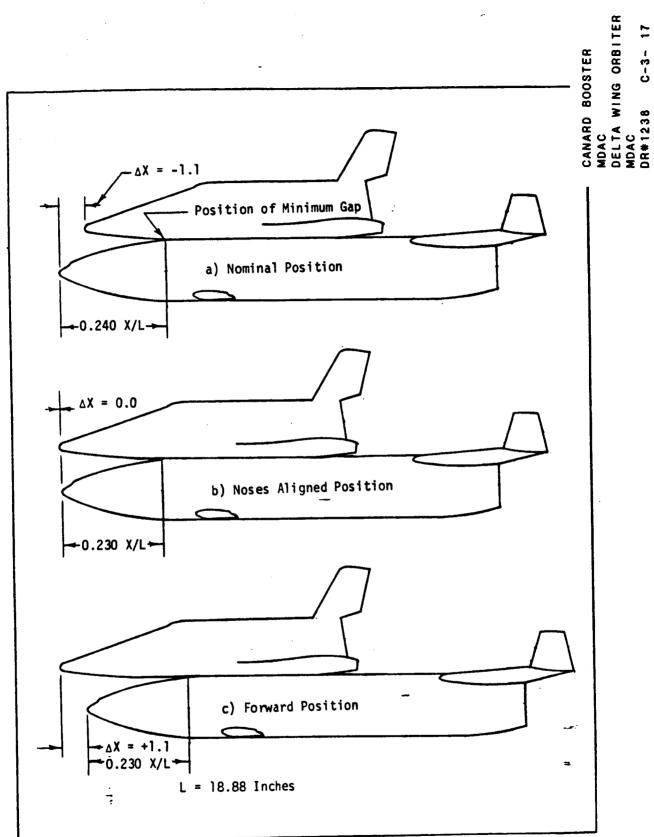


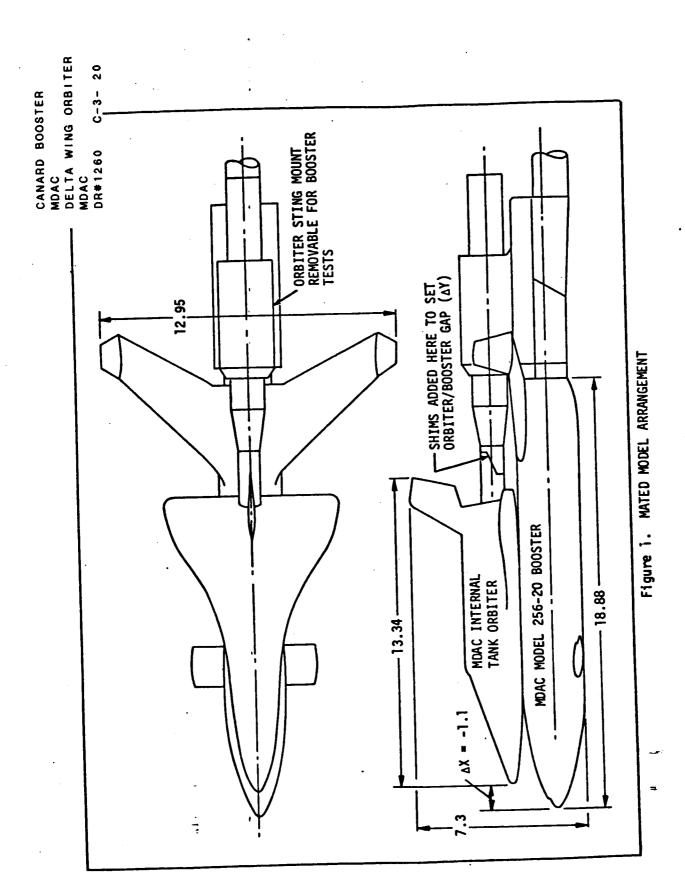
Figure 22. ORBITER POSITIONS USED IN MATED CONFIGURATION TESTS

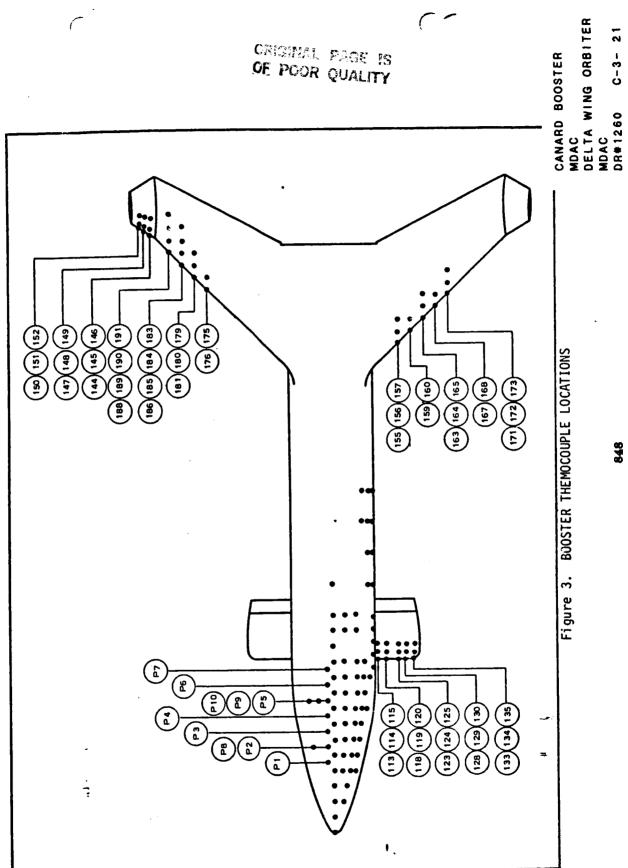
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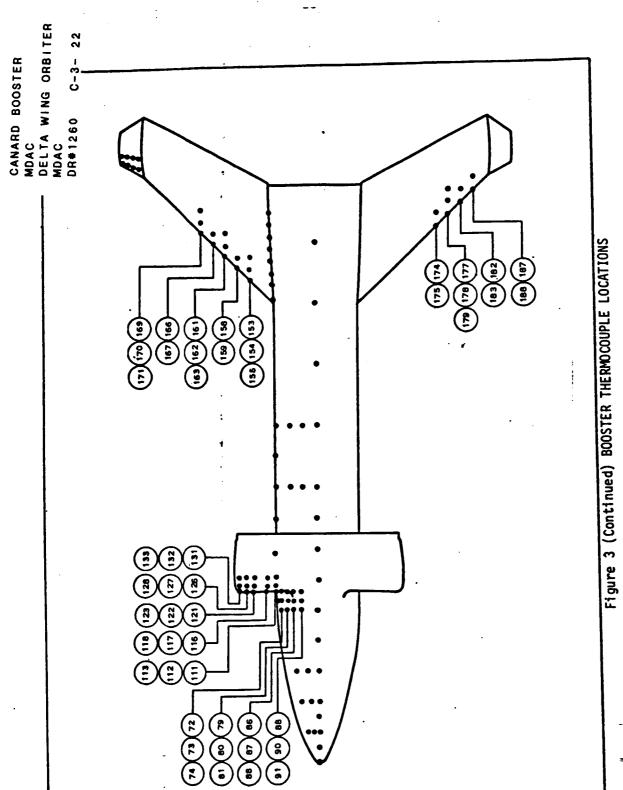
TABLE 15. (CONTINUED)
TEST LARC 10-78 DATA SET/RUN NUMBER
COLLATION SUMMARY

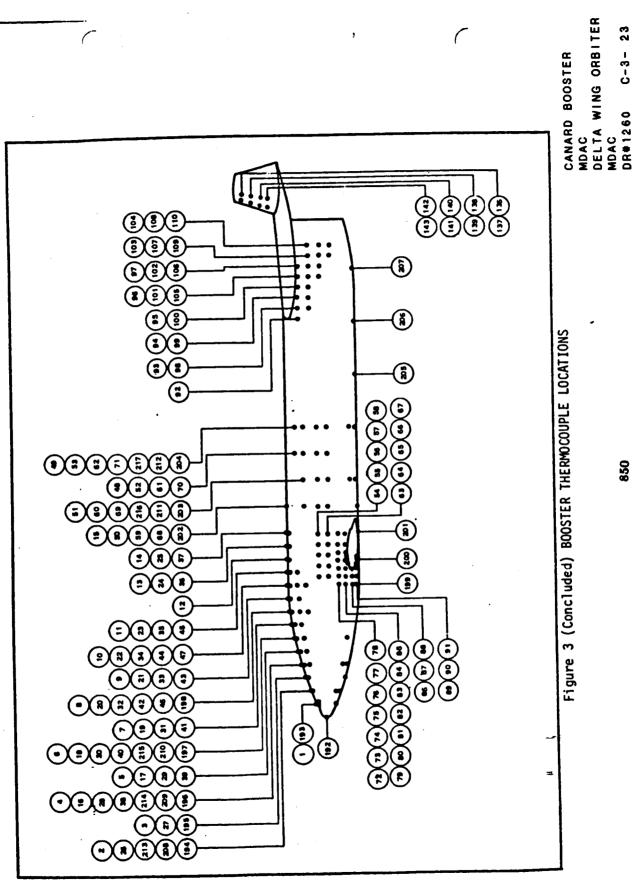
OPRETEST D POSTTEST

						ANCLE	OF ATTRACK	1.	DEGREES						(
DATA SET	<u> </u>		,	(	-	2		ı	Ë					-	
TOENLI PLES					╀	,	-			-					
ROKW OIL	L. WING UPPER SURF	RUNS	2		+	1	+			-			_		
05	L. WING UPPER SURF.		13		12	77	+	1	$\dagger$	+			-		
ð	THE TANKS STIRE T		16		15	117	-		+	$\frac{1}{1}$		+	+	Ţ	
5	The state of the s		10		6	ជ	7.					$\dagger$	+		
6	L. WING LOWER SUNF				٥	000								_	
<u> </u>	R. WING UPPER SURF.	-	179		9	2	$\frac{1}{1}$	-							
BOKW 08	R. WING UPPER SURF.	RUNS	31.		<u>۾</u>	e K	+		$\dagger$	+	1		<del> </del>	Γ	
												1	+		
					-					-			+	T	
					<u> </u>		-								
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				†	+	1	-			-	-				
					4		-		1	+	+				
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		+		†	-			_				_			
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				_						1	+		1		
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		1	+	1	1	-	-								
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		۽	2.5		31	37	43	3	64	2	١				
1	=						-			4	1			]	
		1	1								Ť	LIDPVAR			,
COETT	COEFFICIENTS:												CANARU MONGO		BOOSIER
		RATIO	_										DEL TA	2 2	ORBITER
	MATTER CONFICURATION	RATTON											MDAC	) :	MDAC
							848	,					DR#126	0	3-3-19
							2							,	)

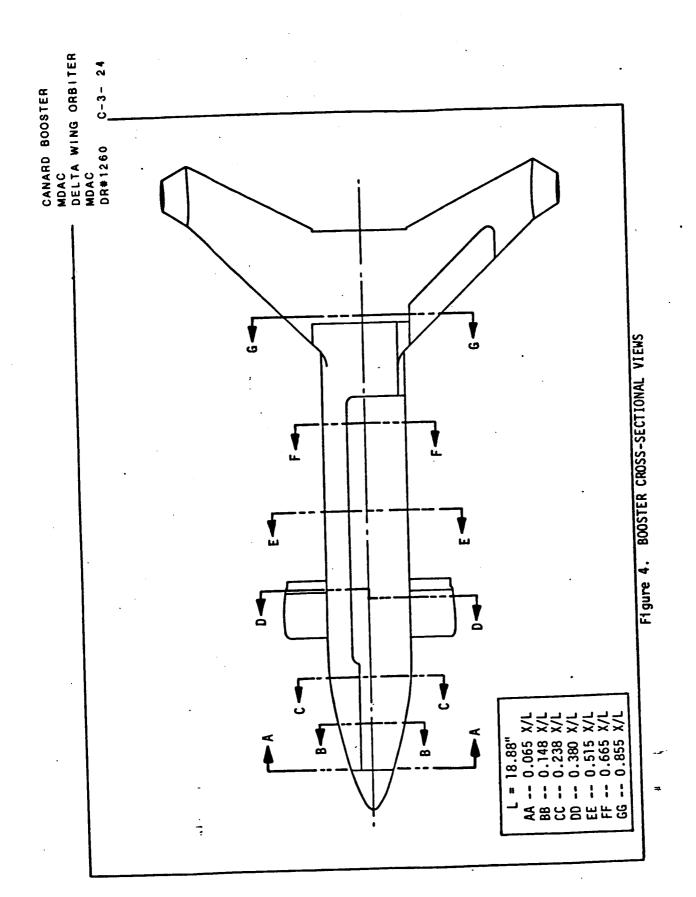


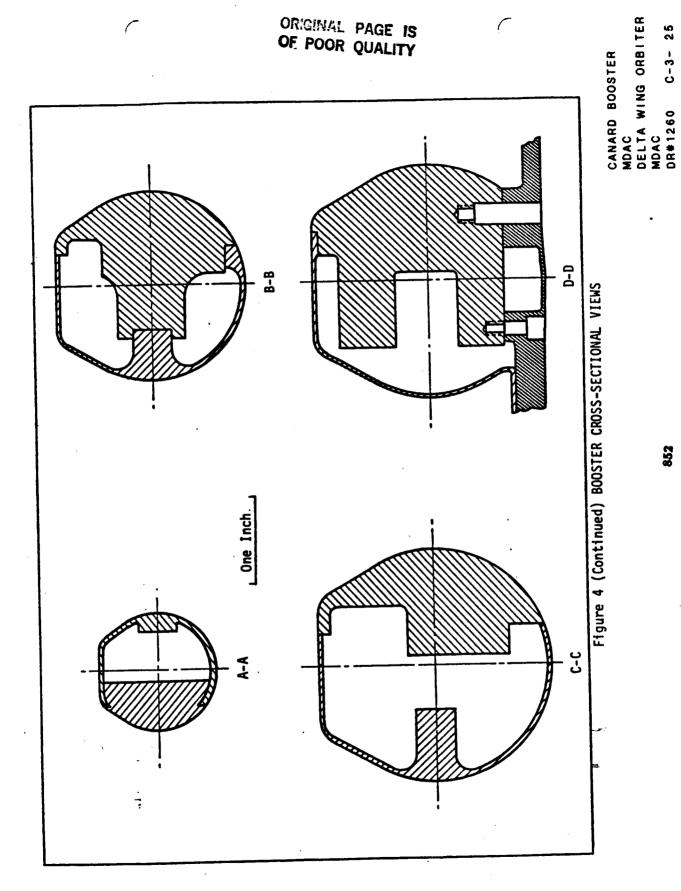




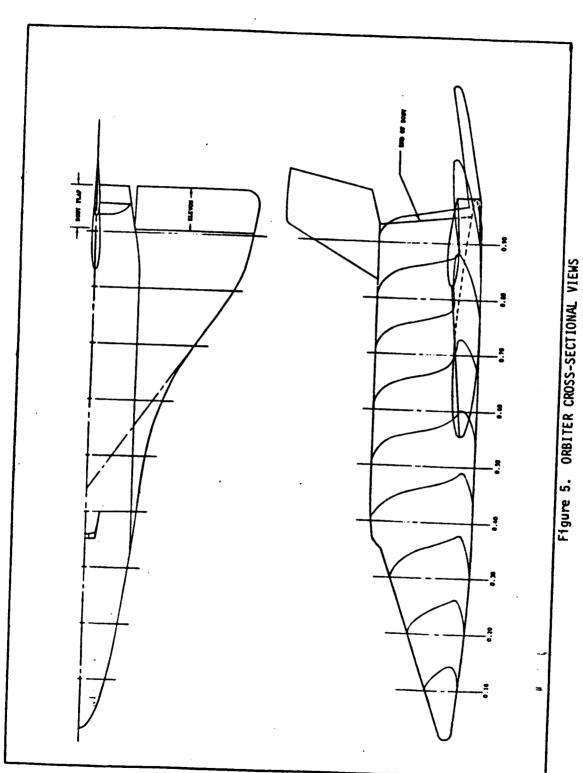


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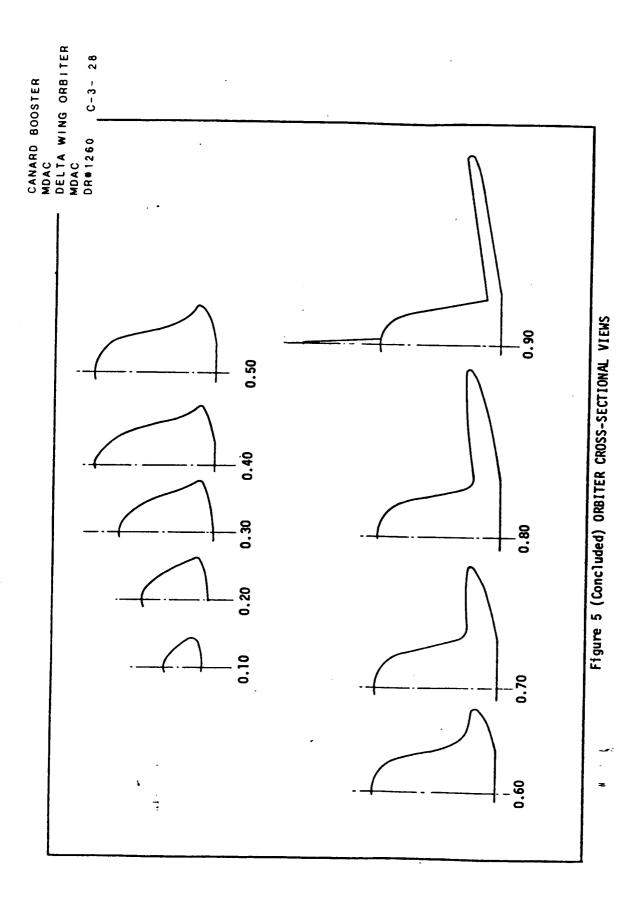




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CANARD BOOSTER MDAC DELTA WING ORBITER MDAC DR#1260 C-3-27



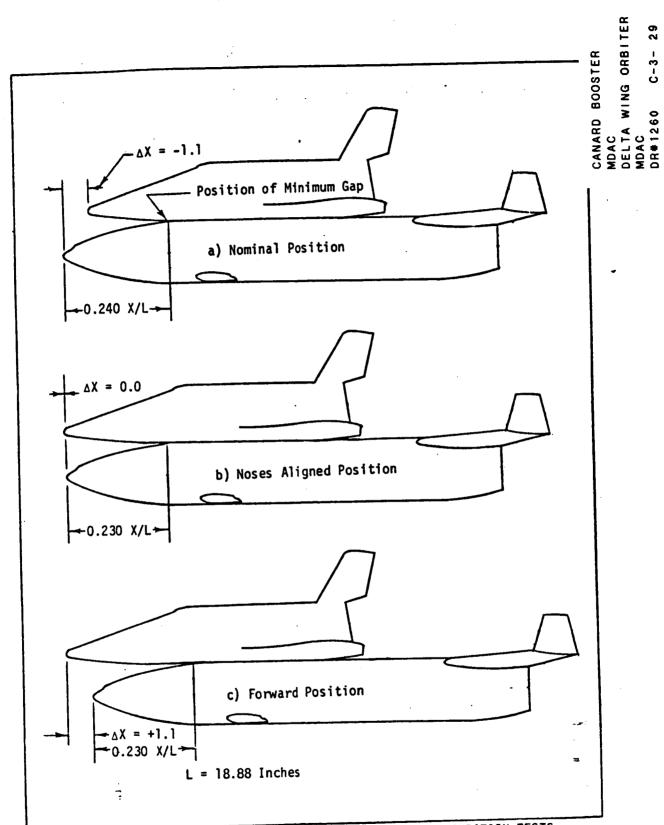


Figure 6. ORBITER POSITIONS USED IN MATED CONFIGURATION TESTS

CANARD BOOSTER MDAC DELTA WING ORBITER MDAC C-3- 30 DR#1262

> PHASE CHANGE COATING TEST DATA SUMMARY SHEET Table 3

TEST TITLE: Ascent Heat Transfer Test of the MDAC Configurations

VT1162-9 TEST NUMBER:

TEST FACILITY: WE Tunnel B

June 1971 TEST DATE:

TEST ENGINEER: R. K. Matthews & W. R. Martindale

₩ 9.	Model Configuration Montification Scale	Model Scale	Free Stream	Total Pressure	Total Temp.	Taw • Ttotal	RNX106 Phase	Phase Change	χ	del Positi (degrees)	tion (	Model
			Mach	(false)	£			Temp.				Surface
			Number					(P.)	8	0	0	
194	MDAC-8 + DMO	0.011	8.0	150	1180	1.0	0.8	400	0	0	0	Side
195								250	0			
196		E						150	0			
107								113/400	0			
261								250	-5			
198								113/500 -5	-5			
199								250/40d	9			
200							<b>_</b> ,	113	5	F		
202		0.011	8.0	555	1310	1.0	2.5	300/200	0			
203								125/500	0			
208								200	0			
204								250/500	5			
205		•	-•	•	_		•	150	5			
					•	# #	Tan " adiabatic wall temperature	all temp	eraber	,		

+Post-test photograph

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:

CANARD BOOSTER MDAC DELTA WING ORBITER MDAC DR\*1262 C-3-31

## PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITIE: Ascent Heat Transfer Test of the MOAC Configurations

TEST NUMBER: VT) 162-9

TEST PACILITY: WKF Tunnel B

June 1971 TEST DATE:

TEST ENGINEER: R. K. Matthews & W. R. Martindale

į							7			ļ:			Γ
<i>§</i>	Model Configuration Mentification	Scale	Stream	Pressure (pais)	Temp.	Trotal	E E	Change (degrees)	<b>1 1 1</b>	degrees)		Mode 1	
			Number					(PF)	8	0	•	ouriace.	6
902 •	MDAC-B + DMO	0.011	8.0	555	1310	1.0	2.5	250/500	-5	l	0	Side	
207					=	2		- SS-	-5				
<del>\$</del>		0.011	8.0	960	1340	1.0	3.7	300/200	0			_	i
ຊ		-		•			Į	00Z	0	igspace	E	H	П
222		0.011	8.0	555	1310	N/A	2.5	01	1			Top/Side	
122							-		,				Π
220	•							Ŀ		L	F	-	Т
224				Ŀ		E		Shado	, c	\ -	•	* *	T
1221					F				6		3	-	Τ
225		F			F				-	L	3	-	T
<b>526</b>		-	-		-	Ļ			4		F	-	Т
									ì	Ţ	1		Т
									T	T			Т
	•				-		Taw " adiabatic wall	1	omperatur.	1.			7

+ Post-test photograph

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1262 C-3-32

PHASE CHANGE COATING TEST DATA SUMMARY SHEET Table 3

TEST TITLE: Ascent Heat Transfer Test of MDAC Configurations (Not Mated)

VTI 162-9 TEST NUMBER:

.

TEST FACILITY: VKF Tunnel B

TEST ENGINEER: R. K. Matthews & W. R. Martindale June 1971 TEST DATE:

											Γ		
		Model	Free	Total	Total	Taw *	RNX100	Phase	Mode	Model Position	itton	•	
Model Config	Model Configuration Identification		Stream	Pressure (neis)	Temp.	Ttotal	星	Change Temp.		(degrees)	(s	Model	<u> </u>
			Number					(PF)	8	9	0		
MDAC-Booster	ter	0.011	8	555	1310	1.0	2.5	125	0	0	0	Top/Side	
-						1		200	0			•	
								113	0				
†								051	9				
								150	-5				
		->	>	<b>^</b>	<b>&gt;</b>	<b>→</b>	٨	113	-5				
		0.011	8	980	1340	1.0	3.7	300	0				
		٠					,	200	0		٠	À	
		0.011	8	255	1310	N/A	2.5	Shado	0		0	Side	$\stackrel{\smile}{=}$
			_		_	1			0		90	Top	
		_					-		5		0	Side	
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MDAC-DWO

291

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292

230

293

Side

Surface Mode1

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Temp.

Martindale

₽.

TEST ENGINEER: R. K. Matthews & W.

June 1971

TEST DATE:

TEST NUMBER: VT1162-9

TEST TITLE:

TEST FACILITY: VKF Tunnel B

Ascent Heat Transfer Test of MDAC Configurations (Not Mated)

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

Model Position (degrees)

RNX106

Change Phase

드

Taw \*
Ttotal

Temp.

Pressure Total.

(peia)

Number Mach

Total

Free -Stream

Model Scale

Model Configuration Identification

Run Yo.

ORIGINAL PAGE IS

OF POOR QUALITY

( Bottom Bottom Bottom Bottom Side Side Side Side Side

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8.0

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882

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• Taw " adiabatic wall temperature

DELTA WING ORBITER MDAC

CANARD BOOSTER

C-3- 33

DR#1262

CANARD BOOSTER MDAC

DELTA WING ORBITER MDAC DR#1262 C-3- 34

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Ascent Heat Transfer Test of MDAC Configurations (Not Mated)

VT1162-9 TEST NUMBER:

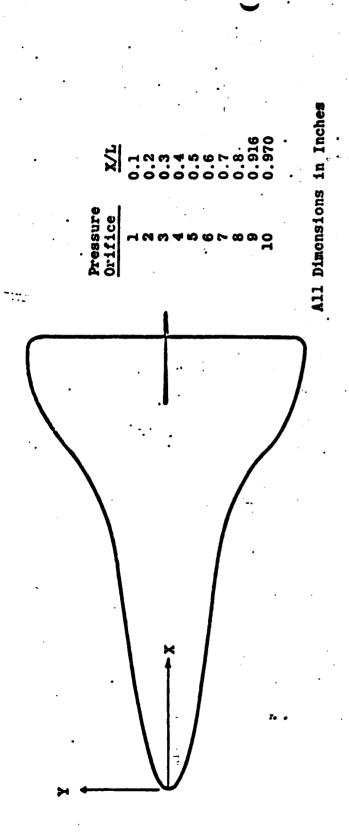
TEST FACILITY: VKF Tunnel B

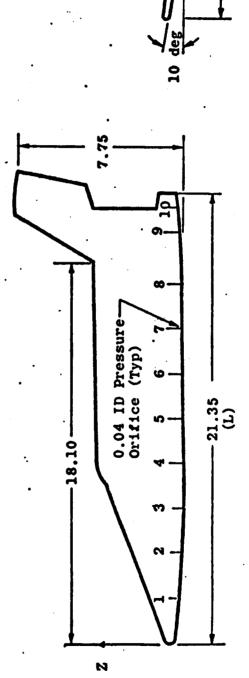
June 1971 TEST DATE:

R. K. Matthews & W. R. Martindale TEST ENGINEER:

Run		Model	Free	Total	Total	Taw *	RNX106	Phase	Mode	Model Position	ition	
S	Model Configuration Identification	Scale	Stream Mach	Pressure (psia)	Temp.		F	Change Temp.		(degrees)	<u></u>	Model Surface
	-		Number					(PF)	४	0	0	
279	MDAC-DNO	0.011	8.0	555	1310	1.0	2.5	100	-5	0	188	Bottom
		-						113	-	_		Side
278						_		113	2			Bottom
		*	>	٨	<b>,</b>	>	۸	113	11			Side
281		0.011	8.0	860	1340	1.0	3.7	113	0			Bottom
								150				Side
282								100				Bottom
		<b>.</b>	·>	1	<b>-</b>	Ļ	7	113	>	>	>	Side
285		0.011	8.0	555	1310	N/A	8.0	01 } 10w	0	0	180	Bottom/S1
283									-5			-
284		·	¥	;*	Ą	<u>_</u>	-		5	^	^	>
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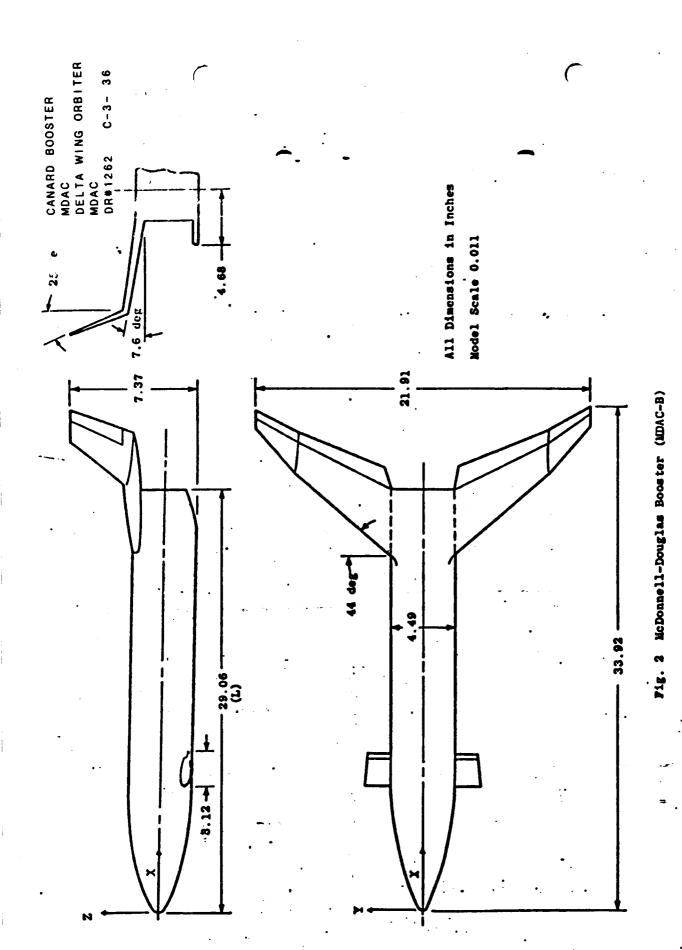
Taw " adiabatic wall temperature





McDonnell Douglas Delta Wing Orbiter Nodel Sketch (0.011 Scale)

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1262 C-3-35



TEST 4/W/7 - 967 DATA SET/RUN NUMBER

COLLATION SUMMARY

- PRETEST

LRC TEST RUN NUMBERS □ POSTTEST (OR ALTERNATE INDEPENDENT VARIABLE) MACH NUMBERS 13-9 2-6 3.7 3-8 7-7 8-1 3-10 13-7 3.9 6-3 1.5 5:5 4-7 3-1 PARAMETERS/VALUES NO. 0 <u>ተ</u> ΔY PM/L 3.48 3.48 3.45 5.51 1.29 5.31 1.31 -5 0 a B SCHD. 3 5 ٠٤. O 5 -5 0 5 0 Boustee + okb tep Alani Brostie + ORb. 18R CONFIGURATION Buster Alone Boostee DATA SET IDENTIFIER 3 10B/HB 4 4

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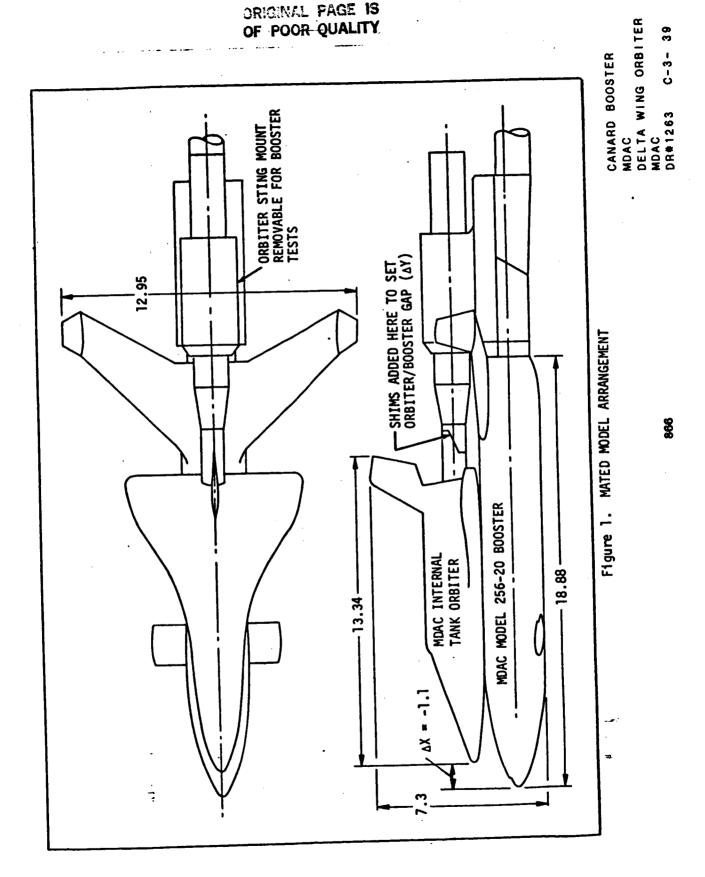
DELTA WING ORBITER MDAC
DR#1263 C-3- 37

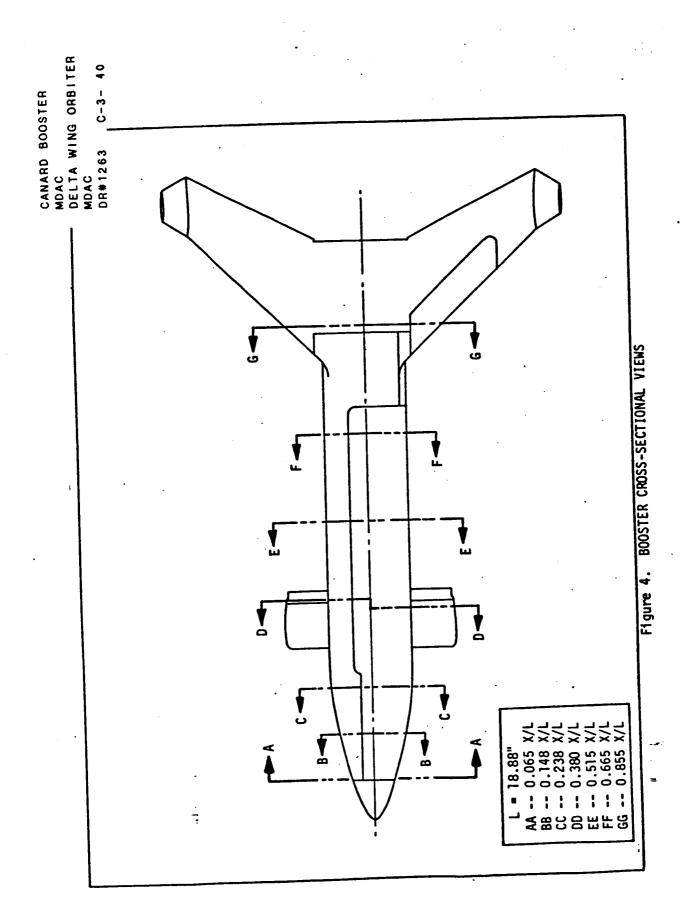
CANARD BOOSTER

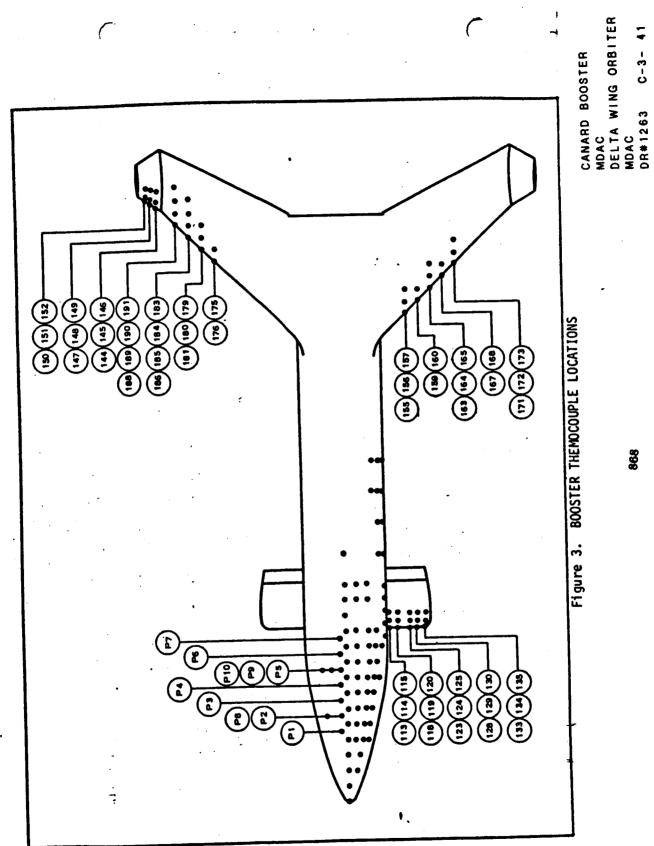
MDAC

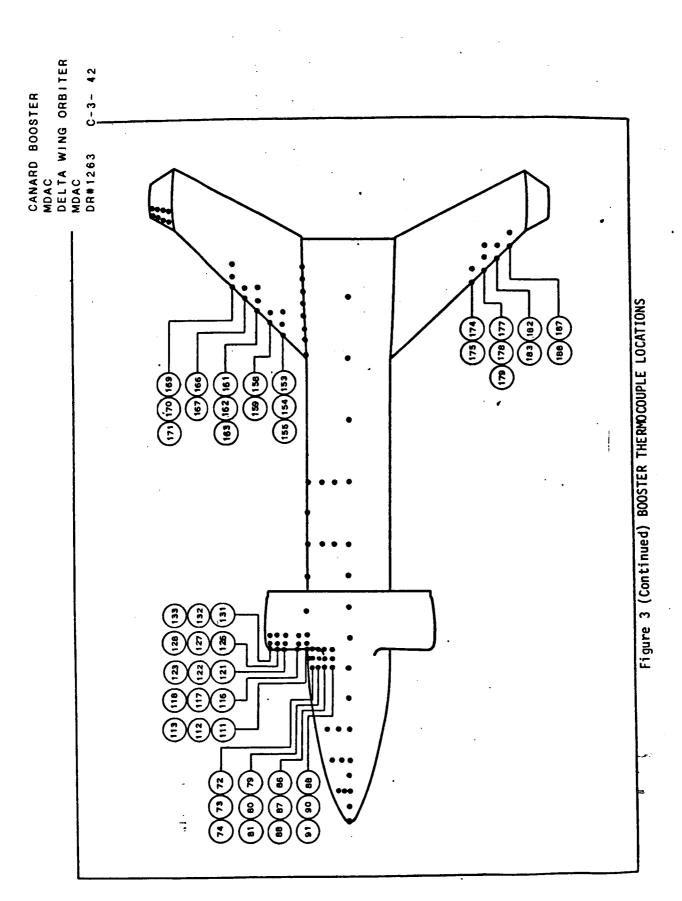
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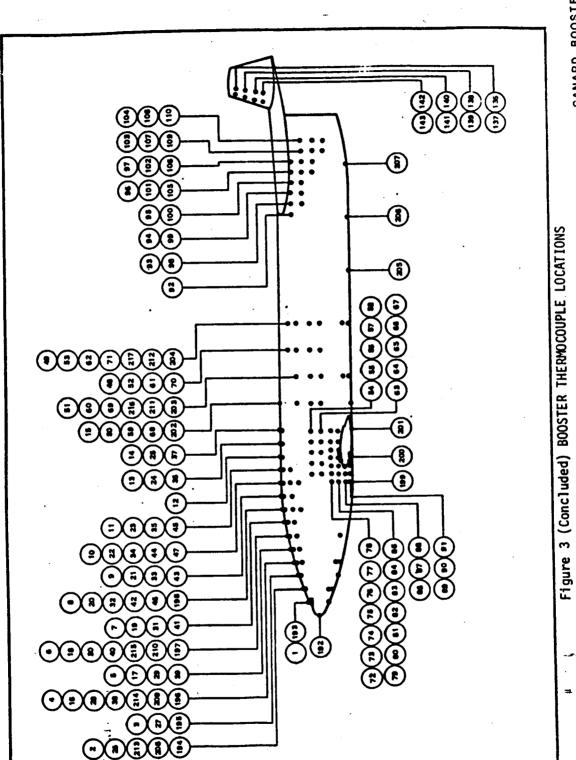
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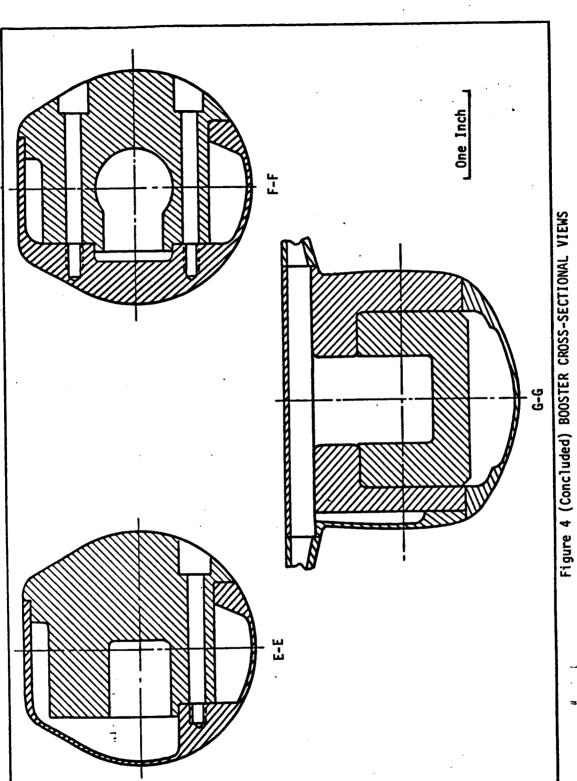




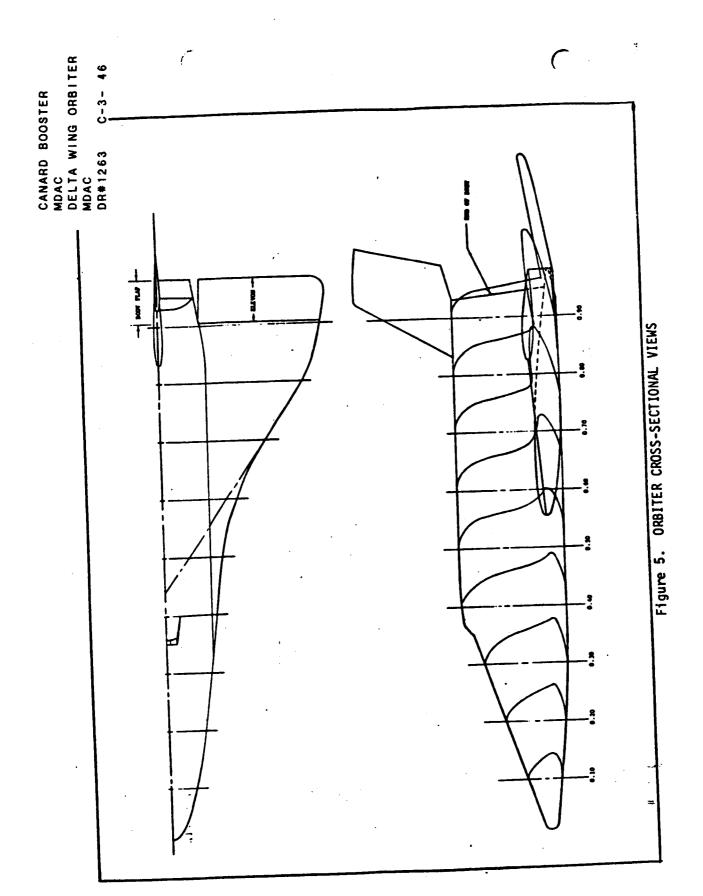


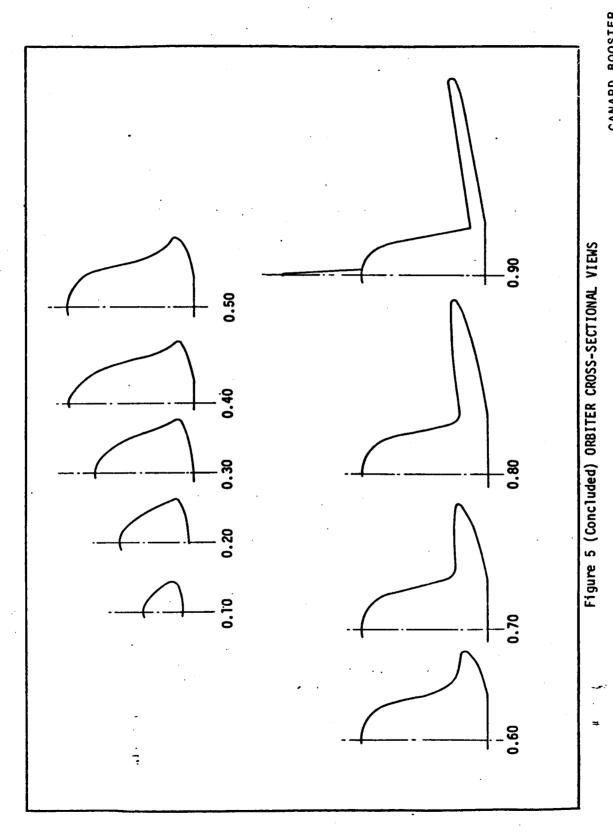
CANARD BOOSTER MDAC DELTA WING ORBITER MDAC DR#1263 C-3-43

871



CANARD BOOSTER
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DR#1263 C-3- 45





- MDAC
DELTA WING ORBITER
MDAC
DR\*1263 C-3- 47

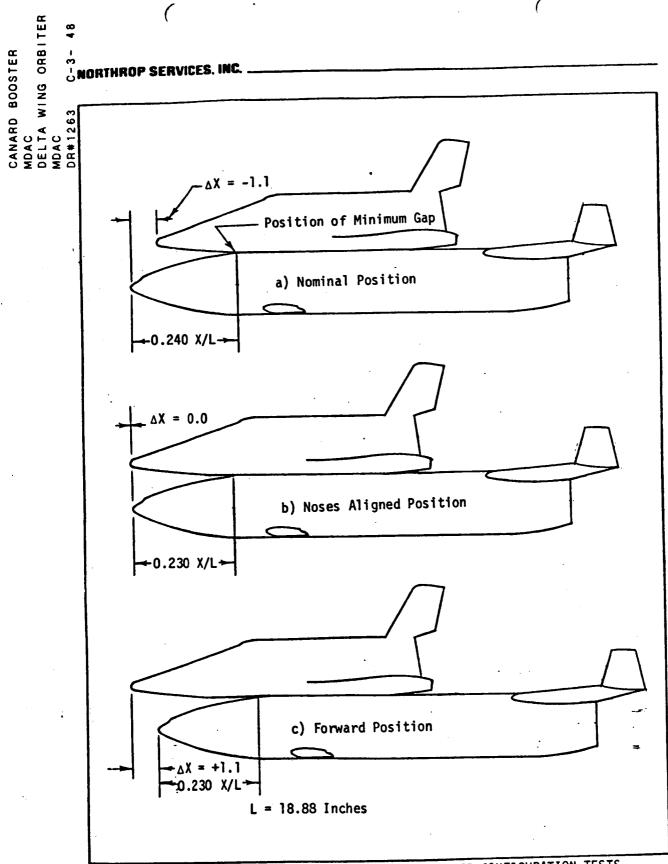


Figure 36. ORBITER POSITIONS USED IN MATED CONFIGURATION TESTS

TABLE III PHASE CHANGE COATING TEST DATA SUMMARY SHEET

MDC/MMC THERMAL MAPPING TEST TEST TITLE:

TEST FACILITY: LRC Mach 8 VDT None

TEST NUMBER:

TEST ENGINEER: Click & Schmitt

TEST DATE: 8/20/70 ----9/28/70

											-		
٩		Model	Free	Total	Total	Taw *	RNX106	Phase	Mode	Model Position	tion	Grid	P.
No.	Model Configuration Identification	Scale	Stream	Pressure	Temp.	Ttotal	F	Change Temp.	g)	(degrees)		Figure No.	No.
			Number	(psia)				(OF)	8	8	ē	Top	Side
147	2	00325	7.71	115	1310	0.95	0,605	250	20	0	180 G85		985
1,0		=	:	115	1260	:	0.645	150		=	:	:	=
9 7		=	7.95	1415	1435		5.967	400	:	=	=	=	٤
		=	=	1415	1420	11	690.9	250	=	=	=	:	=
		=	7.71	115	1265	=	0.641	109	:	:	-	:	=
101		:	:	115	1270	:	0.636	250	-	:	=	<b>C87</b>	<b>G88</b>
15.2	200	=	=	115	1310	=	0,605	150	:	=	=	:	11
		٤	7 95	1415	1470	:	5.738	350	:	=	-	:	11
101	03(c)	:	7.71	L	1285	:	0.624	150	: =	=	:	:	:
2 2	_	] <u> </u>	7.95	535	1440	=	2,242	300	:.	11	:	=	:
15.	-	=	7.71	125	1325	=	0.650	300	40	:	:	G89	1
	O1 (no top or	-	=	145	1335	=	•	150	1.1	:	:		:
1 20	_	=	7.95	1415	1405	11	6.174	300	:	:	:	<b>G89</b>	:
200					£		adiabatio wall temperature	all tomp	Litera	9			

\* Taw = adiabatic wall temperature

•• Tunnel Log Run No. (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70) (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

DELTA WING ORBITER MDAC/MMC C-3- 49 CANARD BOOSTER Sheet 1 of 12 MDAC/MMC

MDAC/MMC DELTA WING ORBITER MDAC/MMC DR#1036 C-3- 50 CANARD BOOSTER

TABLE III ( cont'd. ) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

MDC/MMC THERMAL MAPPING TEST TEST TITLE:

None TEST NUMBER: . - .

TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70----9/28/70

TEST ENGINEER: Click & Schmitt

۽		Model	Fron	Total	Total	Taw *	901XN2	Phase	Mode	Model Position	ition		
No.	Model Configuration Identification	<u> </u>	Stream	Pressure (nsia)	Temp.	Ttotal	F			(degrees)		Figure No.	e No.
			Number					( <sup>O</sup> F)	8	8	Ð	Top	Side
160	(no side camera) O1 (contour tracing)	00325	7.95	1415	1450	0.95	5.933	400	40	0	180	180 G89	:
191	02	:	7.71	115	1370		0, 563	250	4.6		•	G90 G91	G91
162	O2 (contour tracing)	:		115	1310	:	0.605	109	1.6	11	=	-	:
163		:	**	115	1310	11	11	125	11	:	=	C90	:
164	O2 camera tracing	:	:	115	1360	4,	0.569	300	09	-	:	G92	I.
165	02( " ")	:		115	1335	1.1	0.587	200	:	1.	:	=	:
166	O1(contour tracing)	:	11	115	1315	14	0.601	250		:	:	G93	-1
167	O1(no top camera cont. trac)	(	:	115	1320	4.6	0.598	125		1,	=		:
168	mo sid	:	7.95	1415	1490	11	5.614	400		:	=	G93	•
169	01("")	:	14	2101	1485	11	4.049	400	**	11	z	=	;
170	O2(camera tracing)	:	14	1455	1415		6.276	400	"	:	:	G92	
171	O2(no top camera cont.trac	( <u>)</u>	и	1415	1470	11	5.738	125	11	:	:		•
172	O2(negridaterathe)	11	14	1045	1500	11	4,102	400				G92	L 1
							- adiabatic mell temporature	oll town	410000				

\* Taw = adiabatic wall temperature

•• Tunnel Log Run No. (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70) (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

Sheet 2 of 12

TABLE III (cont'd.) PIIASE CHANGE COATING TEST DATA SUMMARY SHEET

MDC/MMC THERMAL MAPPING TEST TEST TITLE:

None TEST NUMBER:

TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70 ----9/28/70

TEST ENGINEER: Click & Schmitt

Run		Model	Free	Total	Total	Taw *	RNX106	Phase		Model Position	ition	Grid	P
No.	Model Configuration Identification	Scale	Stream	Pressure	Temp.	Ttotal	1.5	Change		(degrees)		Figure No.	No.
			Number	(pola)	•	_		( <sup>O</sup> F)	8	0	Ð	Top	Side
173	O2 (camera tracing)	.00325	7.95	615	1460	0.95	2,521	300	09	0	180	G92	;
174	1	:	7.87	315	1390	11	1,433	300	:	=	:	=	:
175	02	:	7.95	1415	1460	11	5,802	300	0	:	:	G94	G95
176	02	=		1415	1475	11	6.578	125	:	:	:	:	:
13	O1 (No top camera)	=	11	1415	1480	11	5.676	250	:	=	:	1	G97
178	01	=		1435	1475	**	5.788	175	=	=	:	965	:
179	01	:	:	1435	1490	Ξ	5,694	125	:	=	:	:	:
206	B1	<u> </u>	7.71	120	1375		0.584	350	09		=	G98	G99
207	B1	=	7.81	220	1380	=	1.032	250	:	1.1	:	:	-
305	B1	=	:	220	1370	1.	1.044	150	:	=	=	:	=
007	BI	=	7.95	1415	1475	:	5.707	350	:	:		:	:
210	B2(Contour tracing)	=	:	1415	1450	=	5,867	200	:	:			G100
211	B2( " ")	=	7.81	215	1375	11	1.014	150				!	=
					•		- adiabatic wall temmerature	umot II a	ornini	٦٥			

\* Taw = adiabatic wall temperature

•• Tunnel Log Run No. (Run 147 thru 179, 1st entry, 8/20,70 thru 8/21/70; (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

Sheet 3 of

DELTA WING ORBITER MDAC/MMC CANARD BOOSTER MDAC/MMC

C-3- 51

DR#1036

DELTA WING ORBITER MDAC/MMC CANARD BOOSTER MDAC/MMC DR#1036

C-3- 52

TABLE III (cont'd) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

MDC/MMC THERMAL MAPPING TEST TEST TITLE: TEST FACILITY: LRC Mach 8 VDT None TEST NUMBER: TEST ENGINEER: Click & Schmitt TEST DATE: 8/20/70----9/28/70

Model Configuration Identification	Model Scale	Free Stream	Total Pressure	Total Temp.	Taw *	RNX106 Ft			Model Position (degrees)		Grid	Ld No.
		Mach	(psia)	(PR)			Temp.				2 mera	Š
		Number					( <sup>O</sup> F)	8	Ø	Ð	Top	Side
B2 (Contour Tracing)	00325	7.81	215	1385	0.95	1.002	250	09	0	180	-	G100
, ,	:	:	215	1360		1,033	400	:	ε	:	L :	:
O2 MA(No side came cont.	rae) ,,	7.71	120	1310		0.632	300	:	=	=	1	1
O2 MA (" " ")	1.	1	115	1295	11	0.617	200	<u> </u>	=	=	1	ŀ
O2 MA (" ")	=	=	115	1310	:	0,586	350	:	=	:	1	:
B2	:	7.81	220	1350	1.1	1,069	150	45	=	:	1	G102
B1	=	E	215	1365		1,026	150	:	:	:	3103	G104
B2		11	220	1390		1,020	350	<u>:</u>	:	:	101	G102
<b>B</b> 1	1.	11	215	1390	11	0.997	350	:		:	1103	G104
B2	11	ıı	220	1395	11	1,014	275	:	:	:	101	G102
B1	11	t	220	1390	11	1,020	275		:	=	1103	G104
B2	1:	11	220	1350	**	1,069	300	30	:	<u>:</u>	3105	G106
B1(no grid for side	11	11	225	1360	**	1.081	300	:	=	:	107	:
			878	•		diabatic w. og Run No. 47 thru 1		entry entry entry	e 7, 8/2 7, 9/1	0//0	thru thru	8/21,
	iguratio	S O E	Scale	Scale Stream Pressu Mach (psia Number   115   120   115   11	Scale Stream Pressure Temp Mach (psia) (AR) Number (psia) (AR) Number 215 1385 1360 17.71 120 1310 115 1295 11 115 1390 11 11 115 1390 11 11 11 115 1390 11 11 11 11 11 1390 11 11 11 11 11 11 11 11 11 11 11 11 11	Scale Stream Pressure Temp. Ttotal Mach (psia) ( <sup>O</sup> R) ( <sup>O</sup> R) Number (1385 0.95 1.771 120 1310 1.771 120 1350 1.771 115 1295 1.771 115 1295 1.771 1.781 220 1390 1.771 1.781 220 1390 1.771 1.781 220 1390 1.771 1.781 220 1390 1.771 1.781 220 1390 1.781 1.	Scale Stream Pressure Temp. Ttotal Mach (psia) ( <sup>O</sup> R) ( <sup>O</sup> R) Number (1385 0.95 1.771 120 1310 1.771 120 1350 1.771 115 1295 1.771 115 1295 1.771 1.781 220 1390 1.771 1.781 220 1390 1.771 1.781 220 1390 1.771 1.781 220 1390 1.771 1.781 220 1390 1.781 1.	Scale Stream Pressure Temp. Ttotal Ft Change Mach (psia) (OR)  Number	Scale Stream Pressure Temp. Ttotal Ft Change Mach (psia) (OR)  Number	Scale Stream Pressure Temp. Ttotal Ft Change Mach (psia) (OR)  Number 215 1385 0.95 1.002 28  " 215 1360 " 1.033 40  " 115 1295 " 0.617 20  " 115 1295 " 0.617 20  " 1.014 22  " 1.020 1390 " 1.026 11  " 220 1390 " 1.020 27  " " 220 1390 " 1.020 27  " " 220 1390 " 1.069 30  " " 220 1390 " 1.069 30  " " 220 1390 " 1.069 30  " " 220 1390 " 1.089 30  " " 220 1390 " 1.089 30  " " 220 1350 " 1.089 30  " " 220 1390 " 1.089 30  " " 220 1390 " 1.089 30  " " 220 1390 " 1.089 30  " " 220 1390 " 1.089 30  " " 220 1390 " 1.089 30  " " 1.081 30  " " 1.081 30  " Taw = adiabatic wall the thru 179, (Run 147 thru 179, (Run 147 thru 179)	Scale Stream Pressure Temp. Ttotal Ft Change Mach (psia) (OR)  Number	Scale Stream Pressure Temp. Ttotal Ft Change (degrees) E1_Concern Conc

## TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

MDC/MMC THERMAL MAPPING TEST TEST TITLE:

None TEST NUMBER:

TEST FACILITY: LRC Mach 8 VDT

"TEST DATE: 8/20/70 ----9/28/70

Schmitt TEST ENGINEER: Click &

Run		Model	Free	Total	Total	Taw *	RNX106	Phase	Mode	Model Position	tion	Grid	Į.
Š.	Model Configuration Identification	Scale	Stream	Pressure	Temp.	Ttotal	Ft	Change		(degrees)		Figure No.	No.
			Mach	(psia)	(PR)			Temp.				Camera Loc	001
			Number					(OF)	8	9	Ð	Top	Side
225	B2	00325	7.81	225	1390	0.95	1.043	225	30	0	180	180 G105	G106
226	B1(camera tracing)	=	:	225	1375	1.	1.062	225	:	11	:	G107	:
227	B2	:	:	215	1400		0.985	150		11	:	G105	G106
228	B1(Camera tracing	:		215	1400	11	11	150	1.	1.1	:	G107	•
229	B2	=	11	215	1360	"	1.033	250	15	:	:	G108	G109
230	BI	:	ı	215	1380	11	1,008	250	=	:	=	G110	G111
231	B2	:	11	215	1395	1.1	0.991	150	:	=	:	G108 G109	G109
232	B1	:		225	1420	**	1,008	150		:	:	G110 G111	G111
233	OI + B1	-	7.71	120	1370	**	0,587	175	0	0	237	G112	237 G112 G113
234	O1 + B2	:	E	125	1335		0.638	175		1.	:	G114	G115
235	O1 + B1		14	115	1330	"	0.590	113		11	-	G112	G113
ဖု	01 + B2	:	4.6	112	1320	1.1	0.582	113	:	:		G114	G115
237	01 + B1	11	7.95	1415	1445		5,834	175	i	Ξ	:	G112	G112 G113

\* Taw = adiabatic wall temperature •• Tunnel Log Run No. (Run 147 thru 179, 1st entry, 6/20/70 thru 8/21/70) (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

DELTA WING ORBITER CANARD BOOSTER MDAC/MMC MDAC/MMC Sheet 5 of 12

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DR#1036

# TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

MDC/MMC THERMAL MAPPING TEST TEST TITLE.

None TEST NUMBER:

TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70----9/28/70 . 7:

TEST ENGINEER: Click & Schmitt

5		Model	Free	Total	Total	Taw *	901XN81	Phase	Mode	Model Position	ition.	2.5-0	Γ,
un v	Model Configuration Identification	Scale	Stream	Pressure	Temp.	Ttotal	Ft	_		(degrees,		oria Eigure No.	• <u>•</u>
			Mach	(psia)	(SR)			Temp.				Jamera Loc	2001
			Number					( <sup>O</sup> F)	8	8	3	Top	Side
238	O1 + B2	00325	7.95	1415	1475	0.95	5.707	175	0	0	237	237 G114	G115
239	01 + B1	=	:	1415	1490	:	5,614	275		:	:	G112	G113
240	O1 + B2	:	:	1415	1520	-	5,437	275		:		G114	G115
241	O3 + B1	=	:	1415	1485		5.645	175		11		<b>G116</b>	G117
242	O3 + B2	:	:	1415	1490	5	5,614	175	:	4.4		G118	G119
243	O3 + B1	=	11	1435	1495	11	5,663	275	=	=	:	G116	G117
244	O3 + B2	=	••	1415	1510	11	5,495	275	**	:	:	G118	G119
245	O2 + B1	=	7.71	135	1360	11	0.669	175		=		G120	G121
246	O2 + B1	=	• •	125	1335	11	0.638	113	:	:	=	=	=
247	O2 + B2			120	1395	11	0.570	113	٤	:	=	22	G123
248	O2 + B2	11	11	120	1350	11	0,601	175	:	:	=	=	=
249	O2 + B1	11	7.95	1440	1510	11	5.592	175	:	=	<u>.</u>	G120 G121	G121
250	O2 + B2		ı	1415	1505	11	5.524	175	:		:	G122 G123	G123

• Taw = adiabatic wall temperature •• Tunnel Log Run No. (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70) (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST FACILITY: LRC Mach 8 VDT MDC/MMC THERMAL MAPPING TEST None TEST NUMBER: TEST TITLE:

TEST ENGINEER: Click & TEST DATE: 8/20/70----9/28/70

Schmitt

							7			1		•	
Run		Model	Free	Total	Total	Taw *	RNX100		abolvi ede	Model Position		Grid	73
No.	Model Configuration Identification	Scale	Stream	Pressure	Temp.	Ttotal	ı.	Temp	<u> </u>	, B.		Comera Loc	ğ
			Mach Number	(psid)	:			(OF)	8	8	Ð	Top	Side
											T		
		00395	7 71	115	1385	0.95	0.553	150	0	0	270	270G124 G125	3125
251	-	. 00323	7 81	215	1435	=	0.947	150	:	Ξ	:	G126 (	G127
252	01 + B2		10:1		200	٤	1 104	150	=	:	:	C128	G129
253	O2 + B1	:	••	220	CRFI		1: 101				:		1 9 1
	L	:	=	215	1410	11	0.974	DC1			- 1	200	721
254	1	٤	==	220	1400	1.1	1,008	150	=	=		G124	G125
255	01 + B1					:	:	195	:	=		G132	G133
1		=	E	220	1400			163			T		
902	+	-	-	920	1410	11	0.997	:	:	:	:	G134 G135	G135
257	B2				100		0 569	13	<u> </u>	٤	96	G135 G137	G137
35.0	T C	<b>.</b>	-1 1 2	115	1300		0.0	_			-		
	Ļ			115	1385	:	0.553	113				G138 G139	G139
2		:	7 08	1415	1526	:	5,437	175	:	Ξ.	270	270G:32 G133	G133
260	B1				100	]:	282	175	-	:	<u>:</u>	F134 G135	G135
0.0	60	:	: 	1415	1490		3.004		_	]:	,		
9	1	  -  -	7.83	215	1375	:	1.014	150	<u>.</u>	=	081	180 G140 G141	G141
<u>'</u>	51		:	210	149	  -  -	176 C	150	:	:	:	G142	1
263	B2(No grid lor side)			617	, 251.		dichesio wall temperature	Toni	- Total	] 2.			

• Taw = adiabatic wall temperature •• Tunnel Log Run No. (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70) (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

DELTA WING ORBITER CANARD BOOSTER MDAC/MMC Sheet 7 of 12

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MDAC/MMC DR#1036

DELTA WING ORBITER MDAC/MMC DR\*1036 C-3- 56 CANARD BOOSTER MDAC/MMC

TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE:

MDC/MMC THERMAL MAPPING TEST

None TEST NUMBER:

TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70----9/28/70

TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach	Total Pressure (psia)	Total Temp.	Taw * Ttotal	RNX106 Ft	Phase Change Temp.		Model Position (degrees)		Grid Figure No. Camera Loc	Ld No.
			Number	•				(OF)	8	8	0	Top	ו מאו
264	B1	.00325	7.95	1415	1470	0.95	5,738	150	0	0	180	180G140 G141	G141
265	B2 (No grid for side)	=	11	1415	1475	:	5,707	14			:	G142	:
266	01	:	7.81	220	1445	11	0.958	150	+2	0	0	G143	G144
267	O1 + B2	11	11	220	1410	1.6	0,997	150	=	11	:	G145	G146
268	O2 + B1			225	1400	11	1.031	150	:			G147 G148	G148
269	O2 + B2	11	11	225	1410	11	1.019	150	:	:	:	G149 G150	G150
270	O1 + B1	11	7.95	1415	1480	11	5,676	175	:	11	=	G143 G144	G144
271	O1 + B2	1.4	11	1415	1470	1.6	5, 739	175	:	11	=	G145	G146
272	01 + B1	4.4	**	1415	1480	11	5.676	175	-5	:	:	G151	G152
273	O1 + B2	11	11	1415	1485	11	5,645	175	=	:	:	G153	G154
274	O1 + B1	11	7.81	220	1345	**	1,076	150	Ξ	=	=	G151	G152
275		**	**	220	1390	**	1.020	150	"	:	11	G153	G154
276	O2 + B1	14	11	220	1420	11	0.985	150	"	:	11	G155 G156	G156
									- 200				

• Taw = adiabatic wall temperature •• Tunnel Log Run No. (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70) (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST FACILITY: LRC Mach 8 VDT MDC/MMC THERMAL MAPPING TEST None TEST NUMBER: TEST TITLE:

TEST ENGINEER: Click & Schmitt .TEST DATE: 8/20/70 ----9/28/70

						١	7	•	:				
Run		Model	Free	Total	Total	Law *	RNXIO	Phase		Model Position	1011	Grid	Į.d
Ņ	Model Configuration Identification	Scale	Stream	Pressure	Temp.	Ttotal	王	Change		(degrees)	T.	Tigure No.	e No.
:			Mach	(psia)	(SR)			Temp.				Camera Loc	a loc-
			Number					( <sup>O</sup> F)	8	8	Ð	Top	Side
977	C0 ± R9	00325	7.81	220	1410	0.95	0,997	150	-5	0	0	G157 G158	G158
278	O2 + B1	Ξ	7.95	1415	1520	=	5,437	175	:	:	=	G155 G156	G156
279	O2 + B2	:	:	1415	1500	:	5.554	175	1.1	ı	=	G157 G158	G158
2 2	O3 + B1	:	7.71	115	1405		0.540	175	0	=	23	237G159 G160	G160
28.2	O3 + B2	:	:	115	1370	:	0.563	175	**	11	= 1	G161 G162	G162
283	O3 + B1	=	=	115	1365	:	0,566	113	:	=	=	G159 G160	G160
200	0% + R2	<u> </u>	] ! i	115	1355	12	0.573	113	:	Ξ	:	G161 G162	G162
	No side camera	:		115	1320	11	0.598	250	09	=	180	1805163	ì
285	O3 (No top camera)		7.95	1415	1510	:	5,495	350	:	:	<u>:</u>	-	G164
986	Sola on	-		1015	1560		3,740	400	;.	=	:	G163	
28.7	∱-			1415	1535	:	5,351	125	:	1.	=	•	G164
.)	K.	:	:	1415	1515	:-	5,466	400	11	<u>.</u>	٤	G163	1
289	4	=	i.	615	1485	:	2,453	125	:	E	=	:	G165
	1									!	!		

\* Taw = adiabatic wall temperature

•• Tunnel Log Run No. (Run 147 thru 179, 1st entry, 8/2C/70 thru 8/21/70) (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

DELTA WING ORBITER MDAC/MMC C-3- 57 CANARD BOOSTER MDAC/MMC Sheet 9 of 12

DELTA WING ORBITER C-3- 58 CANARD BOOSTER MDAC/MMC DR#1036 MDAC/MMC

TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

MDC/MMC THERMAL MAPPING TEST TEST TITLE:

None TEST NUMBER:

TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70 ----9/28/70

-

TEST ENGINEER: Click & Schmitt

Run No.	Model Con	Model Configuration Identification	Model Scale	Free	Total Pressure	Total Temp.	Taw * Ttotal	RNX106 Ft			Model Position (degrees)		Gr Figur	Grid Figure No.
				Mach	(psia)	(X)			1 emp.   ( <sup>O</sup> F)		9	4	Top	Top Side
										6	9	•		
290	O2R(	(No top camera )	00325	7.71	115	1320	0.95	0.598	113	99	0	180	:	G165
291	02		:	:	120	1335	t	0.612	175		1.1	1.1	G166	**
292	O2R	No side camera )	:	:	120	1350	ı	0.601	200		"	"		
293	02 (	No topogamerang)	٤,	1.1	120	1360	14	0.594	113					G165
294	02R (	( " "	=	7.95	1415	1515	4.4	5,466	125			:		11
295	02R (	( " ")	:	**	1490	1520	11	5.725	175	1.1	:			11
296	02		=	11	1045	1465		4,261	125	ı	ŧ	=		:
297	02			4.6	1415	1515	1.1	5.466	175		:	1.1		11
298	03		:		1415	1520	1.1	5,437	113	0	1.1	1.1		G167
299	ဝိ		:	11	1435	1520		5.503	150				G168	11
300	$\sim$	No top camera )	:	11	1435	1505	4.4	5,603	150	20	11		-	G169
301	03		:	"	1435	1515	11	5,543	300	:	11		G170	
302	01(N	O1 (No side camera )	:	7.81	265	1425	11	1, 180	250	09			G163	:

\* Taw = adiabatic wall temperature

•• Tunnel Log Run No. (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70) (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

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## TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST FACILITY: LRC Mach 8 VDT TEST ENGINEER: Click & Schmitt MDC/MMC THERMAL MAPPING TEST None TEST NUMBER: TEST TITLE:

TEST DATE: 8/20/70----9/28/70

									45.	i		2	-0:4		_
R.1.5				Model	Free	Total	Total	1 aw *	RNXIO			Model Fosition		Grid	<b>.</b>
	Model Cor	.fimiration	Model Configuration Identification	Scale	Stream	Pressure	Temp.	Ttotal	F	Change		(degrees)	_	Figure No.	S.
	no ranowi	inger meron			Mach	(nsia)	_			Temp.				Camera Loc	ပို
					Number					( <sup>O</sup> F)	8	8	Ð	Top	Side
														1	Ī
203	10	No side camera	mera	00325	7.95	515	1475	0.95	2.077	350	99	0	180	180G163	:
		No top camera	mera )	:	7.71	120	1345	:	0,605	113	=	=	:		G165
505	OGE	znozuco	tracing/	:	7.81	315	1400	:	1,444	125	:			-	:
ဌ	OZE			=	=	615	1465	=	2.621	175	:	=		-	=
306	OZF								1	1 2 2	:	٤	=		:
307	O2F	:	=	=	7.95	1415	1500	-	5.554	21					
3	64	=	- 1:	=	:	1415	1465	=	5.770	350	:	Ξ	:	G171 G172	2172
S S	7g			-	=	1415	1485	:	5,645	500	<u>:</u>	:	:	G173 G174	G174
309	BI				:	2127	202	:	5 524	500	٤	=	:	G171 G172	G172
310	B2					1415	COCT				<u> </u>	:	<u> </u>	2175: 6176	6176
311	B2			=	=	1415	1500	=	5.554	406	45				
12	ā			:	=	1415	1540	:	5,323	400	<u>.</u>	:	<u>.  </u>	51:0	9
	à			:	1	1315	1560	:	4.845	300	30	:	:	G179 G180	G180
	10 6			=	=	1325	1500	=	5.201	300	<u> </u>	:	=	G181	G181 G182
214	, P.			+				:	100	950	7	:	Ŀ	C183 G184	G184
315	B1			Ξ		1415	1510		5.495	007					
	-								adiativities wall temperature	. Il tomi	no motor	4			

\* Taw = adiabatic wall temperature

•• Tunnel Log Run No.

(Run 147 thru 179, 1st entry, \$/20/70 thru 9/28/70)

(Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

(Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

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Sheet 11 of 12 DELTA WING ORBITER

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DELTA WING ORBITER CANARD BOOSTER MDAC/MMC

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MDAC/MMC DR#1036

TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

MDC/MMC THERMAL MAPPING TEST TEST TITLE:

None TEST NUMBER:

TEST FACILITY: LRC Mach 8 VDT

TEST ENGINEER: Click & Schmitt "TEST DATE: 8/20/70----9/28/70

	. O.		Side	G186	188		G190		•						
Grid	Figure No.		Top	185 G	237 G187 G188		G189 G			G163 -				-	
uo	조18	3	6	180G185	37G1	:	G		180			 	-	-	├
Model Position	(sees)		-				_			11				-	H
odel	(degrees)		8	0				-							-
	<u> </u>	_	8	15	0	<u> </u>	<u> </u>	=	09	=				_	$\vdash$
Phase	Change Temp		GF)	250	113	175	113	175	350	250					
RNX106	Ft			5, 495	0,598	5.645	0.628	5.676	0.620	0.587					
Taw *	Ttotal			0.95	:		11			11					
Total	Temp.	<u>``</u>	-	1510	1320	1485	1280	1480	1290	1335					
Total	Pressure	1		1415	115	1415	115	1415	115	115	,				
Free	Stream		Number	7.95	7.71	7.95	7.71	7,95	7.71	11					
Model	Scale			00325	:	:	E.	=	1	11					
	Model Configuration Identification			B2	(O2 + B1)G	(O2 + B1)G	(O2 + B1)A	(O2 + B1)A	O1 Contour tracings	O1(Neosidencemeriae)					
Run	°.			316	317	318	319	320	321	322					

• Taw = adiabatic wall temperature •• Tunnel Log Run No. (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70) (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

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TABLE IV PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST FACILITY: LRC 31" CFHT

TEST NUMBER:

Click & Schmitt TEST ENGINEER: TEST DATE: 8/24/70 thru 9/11/70

					•	_	901212	Dhoco	Mode	Model Position	tion		_
Σ	Model Configuration Identification	Model Scale	Free	Total Pressure	Total Temp.	Ttotal	F	_	pp)	(degrees)		Grid Figure	
			Mach Number	(psia)				(OF)	8	9	.3	NO.	
										1	3	1-3	
11		2000	10.28	007	1770	6.0	0.525	131	2	-	3		
ŀ	01	25500		:	190	=	Ξ	200	=	=	=	=	•
!	01	<u> </u>	:		201	:	0.520	131	=	=		G-2	
	02	:				=	=	200	=	٥	:	Ξ	
	60	=	=	=	3/1				]:	-	3	6-7	
┸	0.5	=	=	=	1800	:	0.513	113			2	2	
نــــ	01		  -  -	=	1810	-	0.508	=	Ξ	4	=	ئ-4 ائ-4	
	01	-				:	2	15	=	=	06	2-5	
₽-		<u>.</u>	:	=	1740		0.310			-	=	=	1
4	0]	-	=	=	1790	=	=	200	:				7
	01	:	  -  -	  -	1			=	9	0	=		
	02 (No good, flow breakdown)	-				-	0 513	30	<u> </u> =	=	=	9-0	
├	03	=	<u>-</u> \	-	1800		=	350	<u> -</u>	=	<u> -</u>	=	
╂╾		=	=	=	1820				!	ŀ	ŀ	1	T
	0.5	=	=	=	1830	=	0.500	Ξ.	:	ĵ.			T
	02	=	=	=	1790	=	=	275	-	=	=		7
	02						+ T = adjabatic wall temperature	wall tem	peratu	re			•
۱						700							

CANARD BOOSTER MDAC/MMC DELTA WING ORBITER MDAC/MMC DR#1036 C-3-61 C-3- 61

## TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST FACILITY: LRC 31" CFHT " TEST NUMBER:

TEST DATE: 8/24/70 thru 9/11/70 TEST E

TEST ENGINEER: Click & Schmitt

							9012160	1,1,0,0	1	Model Desition	- uoi	
Run No.	Model Configuration Identification	Model Scale	Free Stream Mach	Total Pressure (psia)	Temp.	Ttotal	Ft	Change Temp.	<b>7</b>	degrees)		Grid Figure
			Number	•				(OF)	8	8	ၜ	No.
14	02	. 00325	10.28	007	1800	6.0	0.513	113	09	0	180	G-8
2	02	=	=	11	1780	11	0.523	125	:	+5	:	6-5
16	02	=	11	11	11	11	11	113	=	0	0	G-10
=	02	=	11	11	1820	11	0.503	125	=	5	=	G-11
2	01	=		11	1800		0.523	131	10	С	9	G-12
2	01	=	=	н	1760		=	200	=	=	=	=
2	01	=	11		1750	11	0.525	150	30	=	=	G-13
5	-	:	=	11	1800	"	11	200	Ξ	-	=	=
3	01 (Use grid G-14 & adjust/	=	11	=	1790	:	0.518	=	40	=	=	G-14
23	01	:	=	11	1780		:	250	:	=	=	:
77	01	=	:	:	=	=	0.523	113	10	=	180	G-15
,	01	=	11	:	1820	:	0.503	:	8	Ξ	:	G-16
۲	, and a	:	Ξ	11	1760.	11	0.534	275	99	=	90	G-17
9	1.0.1											

\* Taw = adiabatic wall temperature

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

	•	
	LRC 31" CFHT	Click & Schmitt
TEST	TEST FACILITY:	TEST ENGINEER:
MDC/MMC THERMAL MAPPING TEST	53	0 thru 9/11/70
TEST TITLE: MDC/M	TEST, NUMBER:	TEST DATE: 8/24/70 thru 9/11/70 TEST ENGINEER: Click & Schmitt
,	-:	

													·	_	-+	_	· 1	•
Grid Figure	NO.	G-17	81-5			G-19	н	:		G-20	Ξ	**	3	17-5	ŀ		G-22	
tion	Ð	8	=	T	1	9	=	٥		=	=	"			=	:	•	
del Posit (degrees)	8	0	-			=	=	٤		=	=	=			=	; =	=	بو
Model Position (degrees)	8	9	=	1	=	=	:	=	1		=	ء	:		:		Ξ	ratur
Phase Change Temp.	(P)	350	1	2/7	350	=	113	3	2002	=	113	350		131	350	200	131	all temp
RNX106 Ft		0.518		0.523	=	0.503	0.518			0.503	0.513	٤		0.503	1	,	0.513	* Taw = adiabatic wall temperature
Taw * Ttotal		0		=	=	:	=	:	=	:	:	=		=	Ξ		=	raw = a
Total Temp.		1700		1780	=	1820	1700	2	=	1820	1800	=		1820	1730	1760	1800	•
Total Pressure		9	202	=		11	=			=	=			=	=	-	=	
Free Stream	Number	000	10.20	=	=	11	=		=	=	=		=	Ξ	=	=	-	
Model Scale			.00325	=	=	Ξ		:	=	=	-		-	:	=	=	=	
Model Configuration Identification			81	В2	c	84	B.Z.	В2	B2	- 6	79	181	81	[ d	tracing)	B1 (Bad film no contour, tracing)	Bl (Bad film, no contour/	B2 (No grid taken)
Run No.			27	28	ç	3	S	झ	۶	; ;	3	*	35	7,	ا.	7	38	33

CANARD BOOSTER
- MDAC/MMC
DELTA WING ORBITER
MDAC/MMC
DR#1036 C-3-63

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST FACILITY: LRC 31" CFHT 53 TEST NUMBER:

UMBER:

Click & Schmitt Hanner & Sarver TEST ENGINEER: 8/24/70 thru 9/11/70 "TEST DATE:

<u>+</u>									·	<del></del>				
Grid Figure	NO.	G-22	=	1	G-23	Ξ	G-24	G-25	=	C-26	. G-27	=	C-28	G-29
ition 5)	→	0	:	90	:	:	180	90		180	8	:	180	90
Model Position (degrees)	8	-5		0	=	=	=		=	=	=	=	=	=
Mode (de	8	09		20	70	=	Ξ	50	=	:	40		:	30
Phase Change Temp.	(OF)	350	200	131	400	275	113	325	200	113	200	275	113	175
RNX106		0.539	0.513	_	0.518	0.493	0.508	0.544	0.523	0.503	14	=	0.513	
Taw * Ttotal		0.9	11	11	11	"	11	11			11	11		E
Total Temp.		1750	1800	1830	1790	1840	1810	1740	1780	1820	"	11	1800	н
Total Pressure (psia)		400	=	=	11	11	11	11	11	14	11	11	14	=
Free Stream Mach	Number	10.28	1		11	11	11	11	14	11	:	11	11	=
Model Scale		00325	=	=	=	11	=	=	=	н	=	=	=	=
Model Configuration Identification		В2	в2	Ol (Repeat Run #1) tracing)		02	02	02	02	02	02	02	02	02
Run No.	,	0,7	41	42	43	777	45	97	4.7	87	67	Š	51	53

• Taw = adiabatic wall temperature

Sheet 4 of 11

## TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

MDC/MMC THERMAL MAPPING TEST TEST TITLE:

53 TEST NUMBER:

TEST FACILITY: LRC 31" CFHT

TEST DATE: 8/24/70 thru 9/11/70

TEST ENGINEER: Schmitt, Hanner, Sarver

Run No.	Model Configuration Identification	Model Scale	Free Stream	Total Pressure	Total Temp.	Taw * Ttotal	RNX100 Ft		Mode (d	Model Position (degrees)	ition 5)	Grid	
			Mach	(psia)	<u> </u>			(OF)	8	8	Ð	No.	
_									$\prod$				
	02	.00325	10.28	007	1830	6.0	0.498	225	30	0	90	C-29	
	003	=	=	=	1810	:	0.508	113	14		180	G-30	
1	02	=	=	=	:		1.	11	20	=	:	G-31	
1	0.5	:	=	=	1720	11	0.556		=	=	٥	G-32	
		:	=	=	1810	**	0.508	150	0	=	8	G-33	
	10	:	=	=		10		113	=	=	=	=	
1		=	=	=	1800	11	0.513		:	:	18	G-34	
1	•	=	=	<u>.</u>	1790	=	0.518	200	=	:	=	Ξ	
	81	=	=	=	=	Ξ	=	113	=	=	8	G-35	
		=	=	=	1780	"	0.523	175	=	=	-	=	· · · · · ·
1	B	=	=	=	1790	:	0.518	113	=	=	180	C36	
	l a	=	=	=	1810	=	0.508	175	=	Ξ	=	11	
	B1	=	=		1720	=	0.556	113	=	=	270	G-37	
•							At a land of the second second	11 40	***************************************				

\* Taw = adiabatic wall temperature

DELTA WING ORBITER MDAC/MMC C-3- 65 CANARD BOOSTER MDAC/MMC

GANARD BOOSTER MDAC/MMC DELTA WING ORBITER MDAC/MMC DR#1036 C-3-66

TABLE IV (cont'd.) Phase change coating test data summary sheet

TEST TITLE: MOC/MMC THERMAL MAPPING TEST

TEST NUMBER: 53 TEST FACILITY: LRC31" CFHT

8/24/70 thru 9/11/70 TEST ENGINEER: Hanner, Sarver

TEST DATE:

Ren Yo.

Grid Figure No. G-42 G-40 G-44 G-38 G-39 G-41 G-37 G-41 = 35 = -25 35 = 270 8 0 = Model Position 0 (degrees) = = c 0 = z 0 5 = Ø = = = 8 0 0 9 8 20 9 Change Temp. Phase 113 113 350 200 200 275 175 175 131 OF) = = = RNX106 0.510 0.503 0.561 0.513 0.498 0.536 0.532 0.534 0.508 0.534 三 Ttotal Taw \* 6.0 = = = = Ξ = = = = l٥ Temp. 1830 Total OR) 1710 1800 1820 1835 1790 1805 1810 1760 = Pressure (psia) Total 430 400 400 Z = = = Ξ Number Stream Mach 10.28 Free = = : = = Model Scale .00325 = = = = = = = = = = Model Configuration Identification 01 + B118 + 10 01 + BI01 + B101 + B102 02 B B 5 BI

2 2

3 2 3

73

71

• Taw = adiabatic wall temperature

6-43

0 8

- |2

=

0.513

: :

1800

: | :

2 2

77

92

78

44-0

0

131

0.561

1710

Sheet 6 of 11

DELTA WING ORBITER

CANARD BOOSTER MDAC/MMC C-3- 67

MDAC/MMC DR#1036

## TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/NMC THERMAL MAPPING TEST

TEST FACILITY: LRC 31" CFHT 53 ... TEST NUMBER:

TEST DATE: 8/24/70 thru 9/11/70 TEST ENGIN

TEST ENGINEER: Hanner, Sarver

						-	70			1 10.00	10:1	
Run No.	Model Configuration Identification	Model Scale	Frec Stream Mach	Total Pressure	Total Temp.	Ttotal	F	-05	ф) 	Model Position (degrees)		Grid Figure
		•	Number					(OF)	8	0	6	NO.
٩	0.3	00325	10.28	007	1820	6.0	0.503	250	9	0	8	G-45
		=	=	=	:		16	007	:	=	:	=
g :	03	:	11	=	1790	:	0.518	250	40	=	=	97-5
; 		٤	=	=	1810	:	0.477	325	1		:	=
2 2	03	-	=	=	1780	:	0.523	113	0	=	=	G-47
	20	=	=	=	1795	=	0.515	225	30	=	=	ر-48
28	03	-	=	=	1770	=	0.528	175	н	=	=	Ξ
		=	=	=	1730	Ξ	0.550	=	20	=		G-49
8	03	=	٤	=	1810	=	0.508	131	=	:	11	11
<u>@</u>	03	-	=	:	1825	=	0.500	200	<u> </u>	+5	=	ი-5ე
، ا ہ گر ۔	03	1:	=	<u>"</u>	1820	=	0.503	150	:	=	=	
	O3 (No film, no contour tracing)	- E	=	-	1810	=	0.508	175	2	0	:	G-51
3		=	=	410	1830	=	0.510	113	<u>:</u>		:	10
5	03				1		- salishatio mall tomporature	11 000	ow of	ş		

\* Taw = adiabatic wall temperature

CANARD BOOSTER MDAC/MMC DELTA WING ORBITER MDAC/MMC DR#1036 C-3-68

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST FACILITY: LRC 31" CFRI 53 TEST NUMBER:

Hanner, Sarver & Click TEST ENGINEER: TEST DATE: 8/24/70 thru 9/11/70

		_	-+			_	-	-		_	<b>-</b> r		_		Γ	1			7
Grid Figure	NO.		G-52		C-53	\$ -5°		6-53	G-54	55-0	66-50	1	G-55	G-56	6-57		=	G-58	
tion )	Ð	Ī	8	:	-20	2	3 3	-20	+20	60.	3	=	=	=	٤		=		
del Posit (degrees)	8	T	0	=	=	=	Т	=	=	٤		11	"	•	٤		5	o	1
Model Position (degrees)	8	T	0	=	=	-	1	=	=			=	11	10	۶	3	:	30	
Phase Change Temp.	(OF)		175	113	175		3	325	14	[	113	175	::	113	=		=	=	
RNX106			0.508	0.518	615		0.508	0.514	0.520		0.503	-	0.508	0.493	90.	0.508	0.513	503	-
Taw * Ttotal			6.0	:	=			:	=		=	:	=	٤				٤	
Total Temp.			1810	1790	900	7070	1810	1835	395.	7/67	1820	,	1810	18/0	250	1810	1800	35	787
Total Pressure			400	:		410	400	415	3	400	=	=	=	=		=	=		
Free Stream	Number		10.28	=		:	=	E			:	=	:	-		:	=		
Model Scale			00325	=			=	:			=	-	ء	]:		:	-		=
Model Configuration Identification			03		03	03 + B1	03 + B1		U3 + B1	03 + B1	0.3	(poo on)	03 (Faulty injection)	03	03		03	03	03
Run No.			S		93	76	95		8	97	ê	ç X	66	100 100	101	]	105	103	10 k

\* Taw = adiabatic wall temperature

Sheet 8 of 11

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST NUMBER: 53 TEST FACILITY LRC 31" CFRT

· -

Click & Hanner TEST ENGINEER: TEST DATE: 8/24/70 thru 9/ /70

		Model	Free	Total	Total	Taw *	RNX106		Mode	Model Position	tion	o di di
Run No.	Model Configuration Identification	Scale	Stream	Pressure	Temp.	Ttotal	द	Change Temp.	<u> </u>	(degrecs)	 -	Figure
			Number	(pared)				(OF)	8	8	ø	NO.
											T	
	Ш-	00325	10.28	700	1840	6.0	0.493	113	40	•	180	G-58
	(Repeat of Run	:	=	=	1830	=	0.498	325	50	=	90	G-59
100	02 bished Mod		=	=	1760	=	0.533	113	09	:	180	C-60
107	03					٤	818	175	0	=	+20	G-61
108	03 + B1	-	:	:	26/1				:	=	5	64-2
9	02 ± B1	=	=	:	1820	=	0.503			Т	31	782
E E			-	:	=	=	=	=	=	**	180	G-63
110	02	.   ;		-	1919	=	0.508	175	=	11	:	:
111	02					]			=	=	c	2-64
133	00	=	=	=	1800	:	0.513		1		,	
		=	=	=	1840	=	0.493	=	20	5	=	G-65
113	02	-	=	=	=	=	=	=	=	4	180	G-66
11	02	=	-	-	-	-	:	175	0	0	1-25	t9−0
115	01 + B1		  -	-	1	-	775 0	=	=	=	±35	6-68
116	01 + B1 Revised A1	-			7,7	:		5	٤	c	8	69-5
117	, 02	=	=	=	1780		0.320	30,				
-					•		a adiabatic wall temperature	rall tem	eratu	re		

\* Taw = adiabatic wall temperature

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MDAC/MMC
DR\*1036 C-3-69

CANARD BOOSTER
MDAC/MMC
DELTA WING ORBITER
MDAC/MMC
DR#1036 C-3-70

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST FACILITY: LEG 31" CFHT TEST TITLE: MDC/MMC THERMAL MAPPING TEST 53 TEST NUMBER:

-

Click & Hanner TEST ENGINEER: TEST DATE: 8/24/70 thru 9/11/70

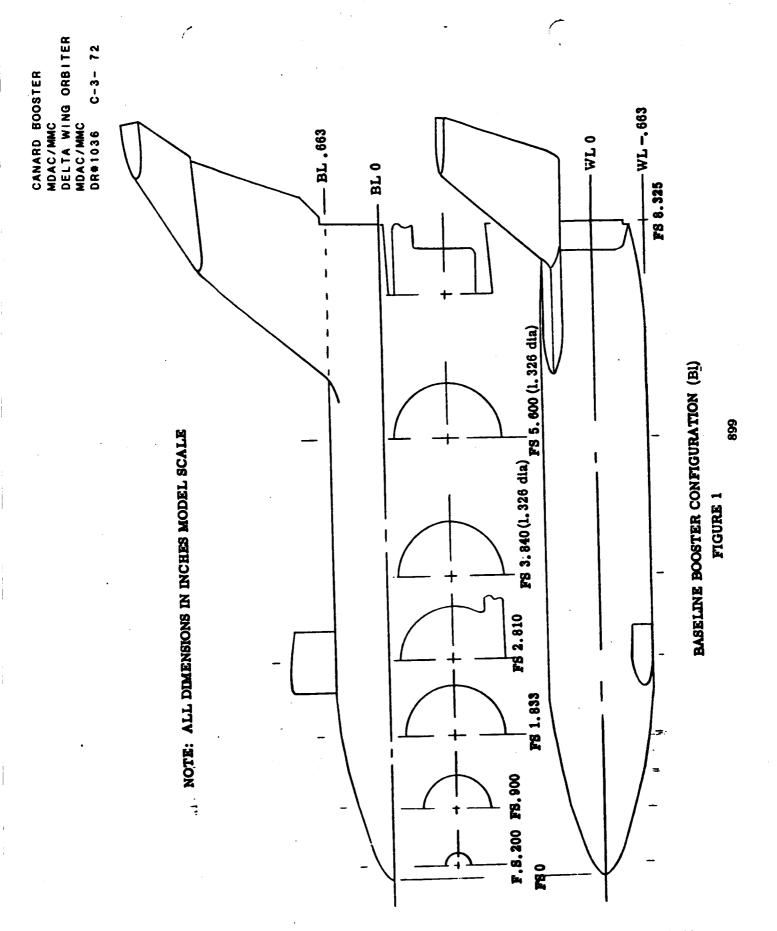
# TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

APPING TEST	TEST FACILITY: LRC 31" CFII	TEST ENGINEER: Click & Hanner
MDC/MMC THERMAL MAPPING TEST	53	4/70 thru 9/11/70
TEST TITLE:	TEST NUMBER:	TEST DATE: 8/24/70 thru 9/11/70

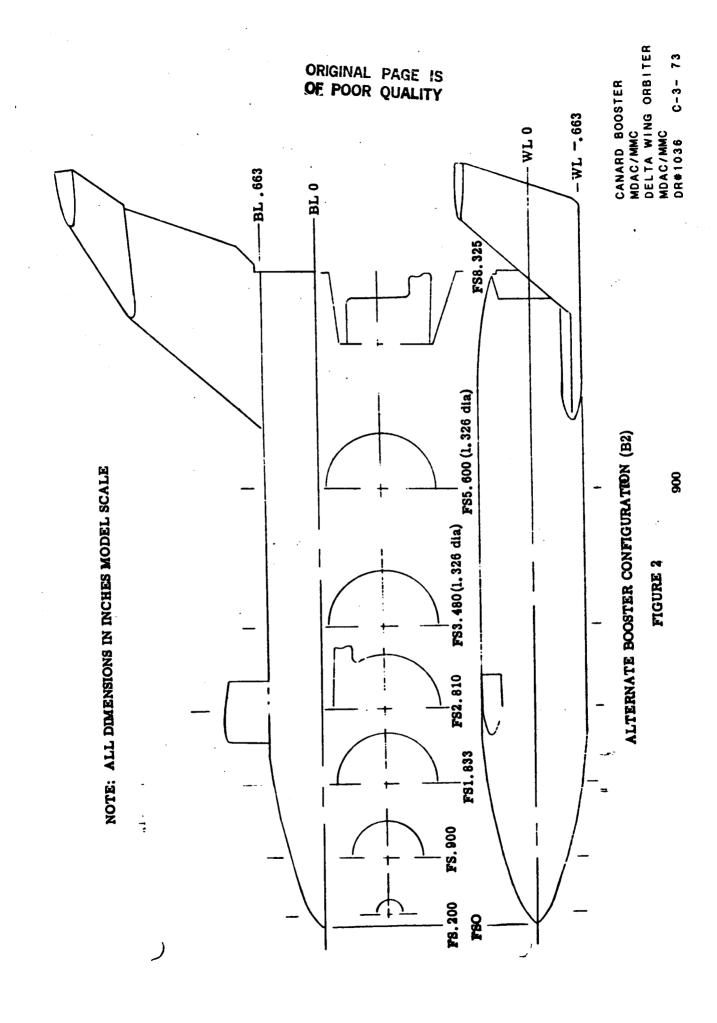
Free         Total         Total         Total         Total         Total         Total         Ft         Change           Mach         (psia)         (^0R)         Ttotal         Ft         Change           Number         400         1850         0.9         0.488         175           "         "         1810         "         0.508         "           "         "         1840         "         0.495         "           "         "         1855         "         0.486         325           "         "         1835         "         0.495         400           "         "         1810         "         0.508         131           "         "         1810         "         0.508         131			1			_	901710	Dhase	Mode	Model Position		
Mach (psia)         (K)         (PF)         Δ         Φ           Number         10.28         400         1850         0.9         0.488         175         0         0         90           10.28         400         1810         "         0.508         "         "         -20           "         "         1840         "         0.503         131         "         125           "         "         1850         "         0.486         325         "         "         +20           "         "         1850         "         0.488         "         "         125           "         "         1810         "         0.508         131         20         "         20           "         "         "         0.508         131         20         "         20	Model Configuration Identification Scale	le le		Total Pressure	Total Temp.		E E	Change	Ď	grees)		id
10.28       400       1850       0.9       0.488       175       0       90         "       "       1810       "       0.508       "       "       -20         "       1840       "       0.493       "       "       220         "       1820       "       0.486       325       "       +20         "       "       1855       "       0.486       "       +20         "       "       1835       "       0.488       "       "       +20         "       "       1835       "       0.508       131       20       "       90         "       "       1810       "       0.508       131       20       "       270         "       "       "       "       "       "       "       "       "       "       "         "       "       "       0.508       131       20       "       "       "       "         "       "       "       "       "       "       "       "       "       "       "       "       "       "       "       "       "       "			Mach	(psia)	(મું)			(OF)	8	-	·r—	
10.28       400       1850       0.9       0.488       175       0       90         "       "       0.508       "       "       -20         "       1840       "       0.493       "       "       225         "       1820       "       0.503       131       "       125         "       "       1855       "       0.486       "       "       -20         "       "       1850       "       0.488       "       "       -20         "       "       1835       "       0.495       400       60       "       90         "       "       1810       "       0.508       131       20       "       270         "       "       "       0.508       131       20       "       1										+	ļ	
"       0.508       "       "       -20         "       1840       "       0.493       "       "       270         "       1820       "       0.503       131       "       225         "       "       1855       "       0.486       325       "       +20         "       "       1850       "       0.488       "       "       +20         "       "       1835       "       0.495       400       60       "       90         "       "       1810       "       0.508       131       20       "       170         "       "       "       0.508       131       20       "       60         "       "       "       "       "       "       "         "       "       "       0.508       131       20       "         "       "       "       "       "       "         "       "       "       "       "       "         "       "       0.508       131       20       "         "       "       "       "       "       "	00325	יצי וו	1_	007	1850	6.0	0.488	175	0		_	6/-
1840   1   1840   1   270   1   1820   1   0.503   131   1   1   225   1   1855   1   1   1850   1   1850   1   1850   1   1850   1   1835   1   1   1835   1   1   1835   1   1   1835   1   1   1810   1   1   1810   1   1   1   1   1   1   1   1   1	=	. i	4		1810	:	0.508	=	=			옭
"       1820       "       0.503       131       "       225         "       1855       "       0.486       325       "       +20         "       1850       "       0.488       "       "       -20         "       1835       "       0.495       400       60       "       90         "       1810       "       0.508       131       20       "       270         "       1810       "       0.508       131       20       "       270         "       1810       "       0.508       131       20       "       270         "       1810       "       "       18       "	-	1	-	:	1840	=	0.493	ŧ		127		두
"       1855       "       0.486       325       "       +20         "       1850       "       0.488       "       "       -20         "       1835       "       0.495       400       60       "       90         "       1810       "       0.508       131       20       "       270         "       1810       "       0.508       131       20       "       270         "       1810       "       0.508       131       20       "       270	=	1	<u> </u>	=	1820	=	0.503	131	:			-82
1850   1 0.488   1   1   20   20   1   20   1   20   1   2   2   2   2   2   2   2   2   2	=	•	=	=	1855	:	0.486	325				-78
" 1835 " 0.495 400 60 " 90	-		-	=	1850	:	0.488	:			_	8
" 1810 " 0.508 131 20 " 270	-		=	:	1835	=	0.495	007	09			-83
	=		=	-	1810	-	0.508	131	2			-84
			1									
									_		- - -	
										<u> </u>	-	
											_	
	-	1		-	_							
		ì			1	1				1-	-	
						_			4		1	

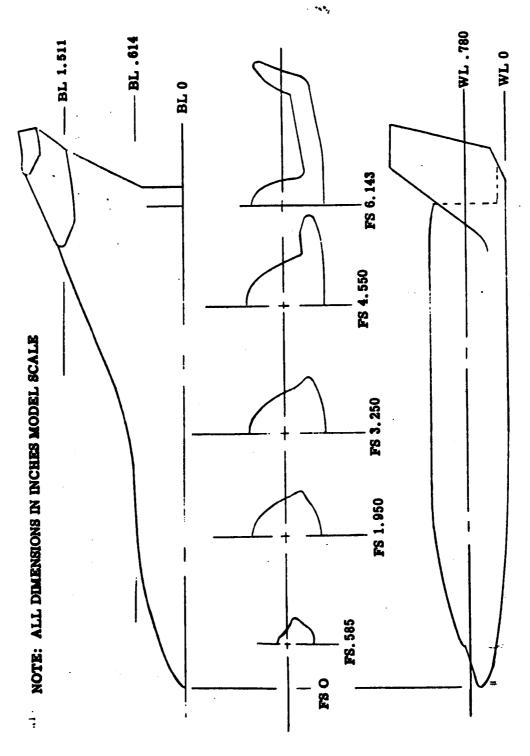
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CANARD BOOSTER MDAC/MMC DELTA WING ORBITER MDAC/MMC DR#1036 C-3-71



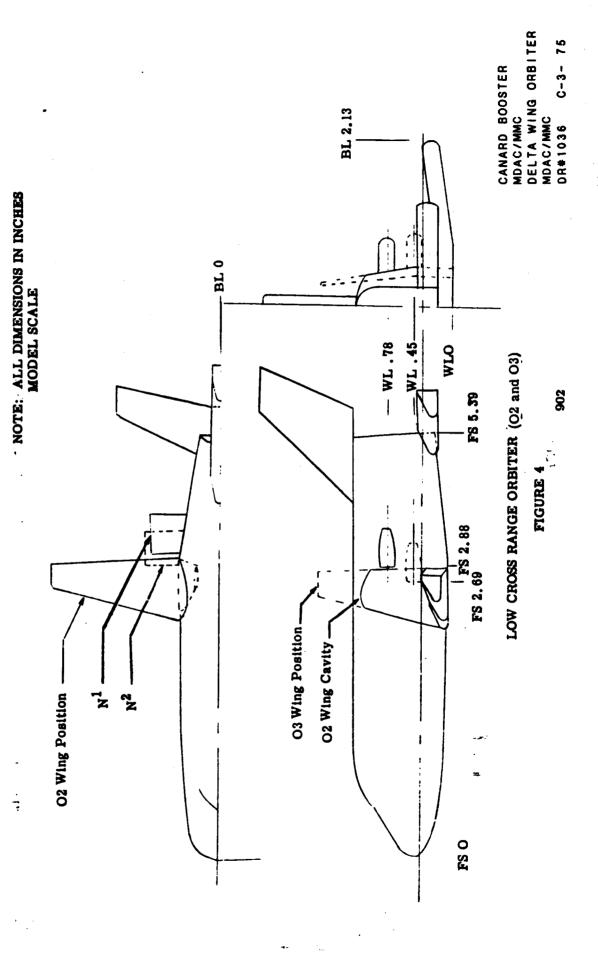
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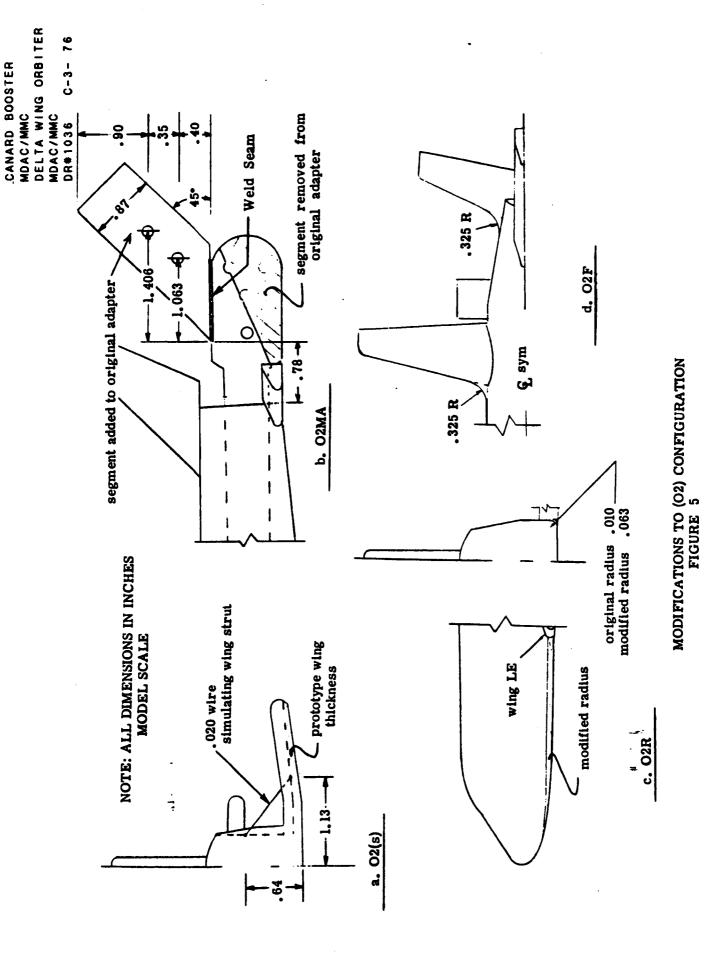


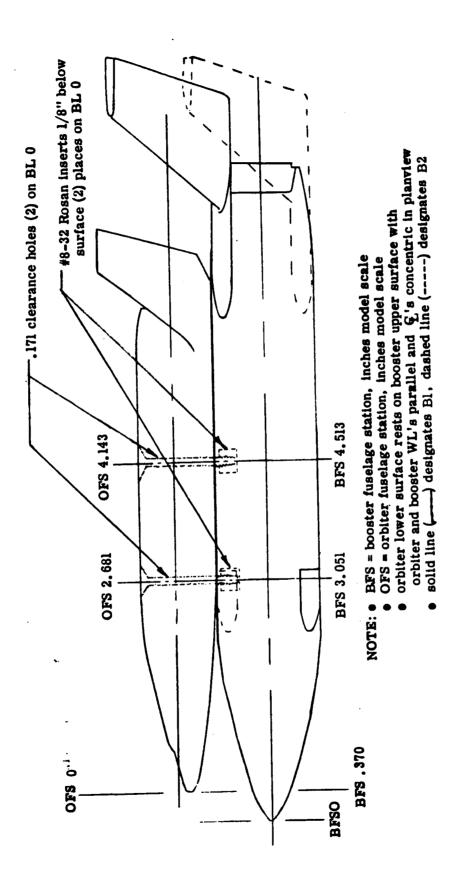


HIGH CROSS RANGE ORBITER (OL)

FIGURE 3

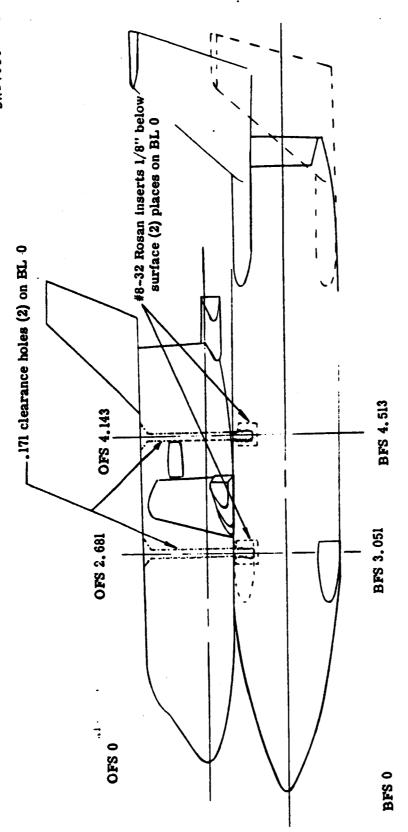






LAUNCH VEHICLE(High Cross Range Orbiter + Booster), Cl + Bl & Ol + B2 FIGURE 6

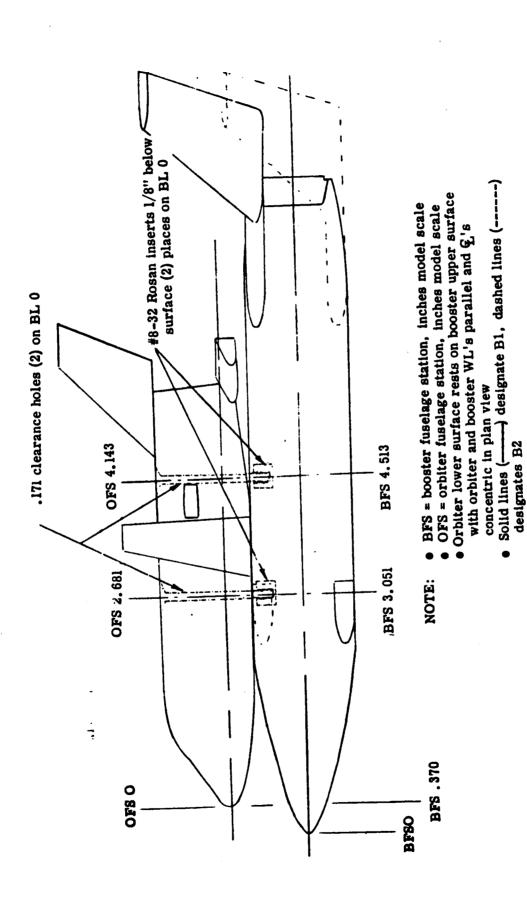
CANARD BOOSTER
MDAC/MMC
DELTA WING ORBITER
MDAC/MMC
DR#1036 C-3-77



NOTE: • BFS= booster fuselage station, inches model scale
• OFS= orbiter fuselage station, inches model scale
• Orbiter lower surface rests on booster upper surface with
orbiter and booster WL's parallel and C's concentric in planview
• Solid line (\_\_\_\_) designates Bl, dashed line (\_\_\_\_) designates B2

BFS .370

LAUNCH VEHICLE(Low Cross Range, wings unfolded Orbiter + Booster), 02 + Bl & 02 + B2 FIGURE 7



LAUNCH VEHICLE(Low Cross Range, wings folded Orbiter + Booster), O3 + B1 & O3 + B2 FIGURE 8

DELTA WING ORBITER C-3- 79 CANARD BOOSTER MDAC/MMC MDAC/MMC

DR#1036

MODIFICATIONS TO (02 + BI) CONFIGURATIONS FIGURE 9

THIN SKIN THERMOCOUPLE TISST DATA SUMMARY SHEET

TEST TITLE: HEAT TRANSFER STUDY OF THE GRUMMAN H-33/HO GEBITER

546 TEST NUMBER:

TEST FACILITY: NASA/LRC-VDF

TEST DATE: CCTOBER 14-21 ,1971

TEST ENGINEER: A. D'Errico

1918   P, Wl, Vg, Q1   C, O5   7.9   304   1312   1.0   1.6   11/A   0   0   0   0   0   0   0   0   0
rear)

TABLE & (Continued)

THIN SICH THEMCOURLE TEST DATA SUCCERT SHEST

TEST TITLE: HEAT TRANSFER STUDY OF THE GRUMMAN H-33/HO ORBITER

TEST FACILITY: MASA/LRC-VDF <u>%</u> TEST NUMBER:

A. P'ERRICO TEST ENGINEER: TEST DATE: OCNOBER 14-21, 1971

Run	Model Configuration Mentification	Model Scale	Free	Total Pressure	Total Temp.	Taw •	RNX106		Mode (tle	Model Position (degrees)	tion (	Camera ** Location	Camera Location	: 5
•			Mach Number	(psia)	Ę	_		oF)	8	8	Ð	7.	$\vdash$	×
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2 2				101	11.72		9.0		8				T	
2 71		_		1107	1382		5.1			_				
3 3				1866	1341		9.8							1
20,00				2501	1274		12.8							
2001		L		293	1236		1.7							
		L		283	1250		1.6		0		日			
<u>ब</u>		-	-	8	1270		1.6	•	-	•	•			
9 11		1								·				
		_												
		_			_									╝
]×××	** X agis parallel to stream (+downstream, -upstream) Y axis (! fight, -left, as viowed from the rear) Z axis (! up, -down)	cam, -t	upstream) ear)		•	T. Walt	• Taw :: adiabatic wall temperature	all tem	eratu	re			•	

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OIL PLOW TEST DATA SUBMARY SHIEF

HEAT TRANSPER STUDY OF THE GRUPPAN H-33/HO GREITZR TEST TITLE:

546

TEST NUMBER:

TEST ENGINEER: A. P. PRINTO TEST DATE: OCTOBER 14-21, 1971

TEST FACILITY: NASA/LIG-VDF

ا														
8	No. Model Configuration Edentification Scale	Mudel Scale		Total Pressure	Tetal Temp.	Tradit	RNX100 Physics	Phase Clamer	Junit.	Medic Position Comera.	Ition	Cin I	er.	!
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				1	T	1					1	$\dashv$		
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 ≻ :	Y axis (+ right, - left, as viewed from the rear)	the rea	î		-	ŧ					٠	I down 1 yo	0	-
2	ixis (+up, -down)								•		ט פ	- C	2	-

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CYLINDRICAL BOOSTE GAC DELTA WING ORBITEF GAC DR#1234 C-3-83

84

DELTA WING ORBITER C-3-DR#1234

TARE 6

Phase change coating test data bummary sheet

HEAT TRANSFER STUDY OF THE GRUPMAN E-33/HO ORBITER TEST TITLE:

TEST FACILITY: NASA/LRC-VDT £ TEST NUMBER:

A. D'ERRICÓ TEST ENGINEER: TEST DATE: OCTOBER 14-21, 1971

Camera. Location ~ Model Position Ð (degrees) ४ Champe Phase Temp. (O.F.) 119 150 8 119 150 8 8 8 8 <u>5</u> 250 250 RNX106 10.8 10,8 5.2 료 Taw + Ttotal Temp. Total 1250 12/0 1260 1390 doll 1400 1238 1285 1415 1415 1375 1395 1385 Pressure (psia) Total 305 305 1135 305 305 115 1165 1865 2515 515 1115 1865 305 Number Stream Mach Free Model Model Configuration Mentification Scale 8, DS WILL VS PL WHI ผู้ Run No. 19/61 9761 1970 1930 1982 1983 1931 1971 1.77.3 1:17 1931 1935

30

.. X axis parallel to stream (+downstream, -upstream)

Y axis (rright, - left, as viewed from the rear) Z axis (rup; -down)

. Tuw adiabatic wall temperature

CYLINDRICAL BOOSTER GAC DELTA WING ORBITER

C-3- 85

DR#1234 GAC

#### TABLE 6 (Continued)

## PHASE CHANGE COATING TEST DATA SUMMARY SHEET

.

TEST TITLE: HEAT TRANSPER STUDY OF THE GRUPMAN H-33/HO GRETTER TEST NUMBER:

TEST FACILITY: MASA/LRC-VDT 2<u>F</u>6

A. D'ERRICO TEST ENGINEER: october 14-21, 1971 TEST DATE:

2		Model	1.0										
ġ.	Nodel Configuration Identification Scale	Scale		Total Pressure (Psia)	Total Temp.	Taw .	RNX 106	Phase Change Tom	ž	degrees)	€	Camera ••	: 5 E 5
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्र इ		ļ	+	1	55		5.1	8	F	1:	Ţ	$\dagger$	T
J.Co	B's Ulil Ve Q	‡	7	1115	1385	_	17.5	150	+	+	1	+	1
જાર	B. C. C.	1		305	1250		T		#	1			
3	1 5 15 W	_		305	9,0	1	T	3		၁	_		
+	15 Will V5 G		Ë	T	3		1.7	150	_	L		+	T
S		+	+	7	1260	_	6.2	150	+	+	1	+	7
X w	X axis parallel to stream to		-	305 12	1270		-	7	+				
ã ≻	Y axis (+ right - left at minute )	18dn - ·	ream)		:			3		-		$\vdash$	Γ
2	Z axis (+up, -down)	o rear)			3 <b>d</b>		. amagatic wall temperature	tempera	iture		1	1	7
	•												

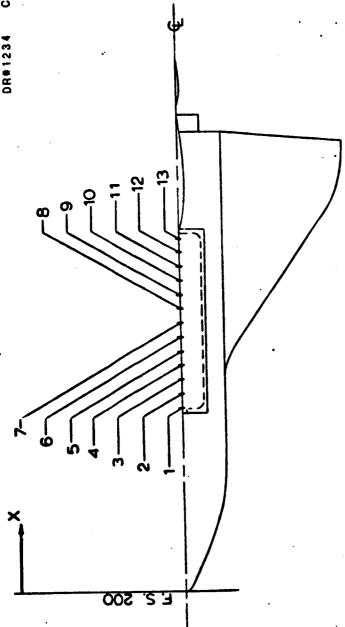


FIGURE 1. ORBITER THERMOCOUPLE LOCATIONS (UPPER SURFACE)

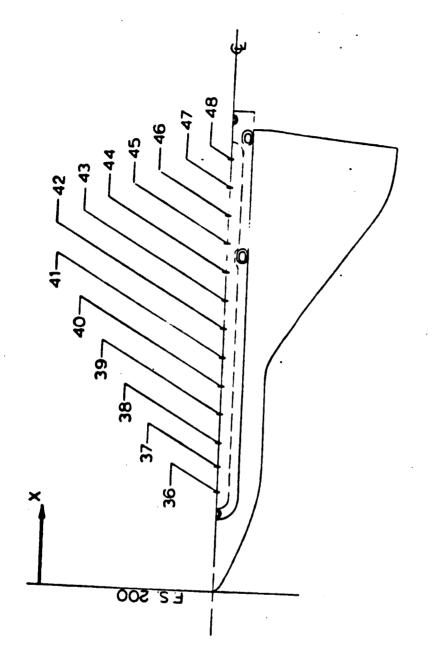
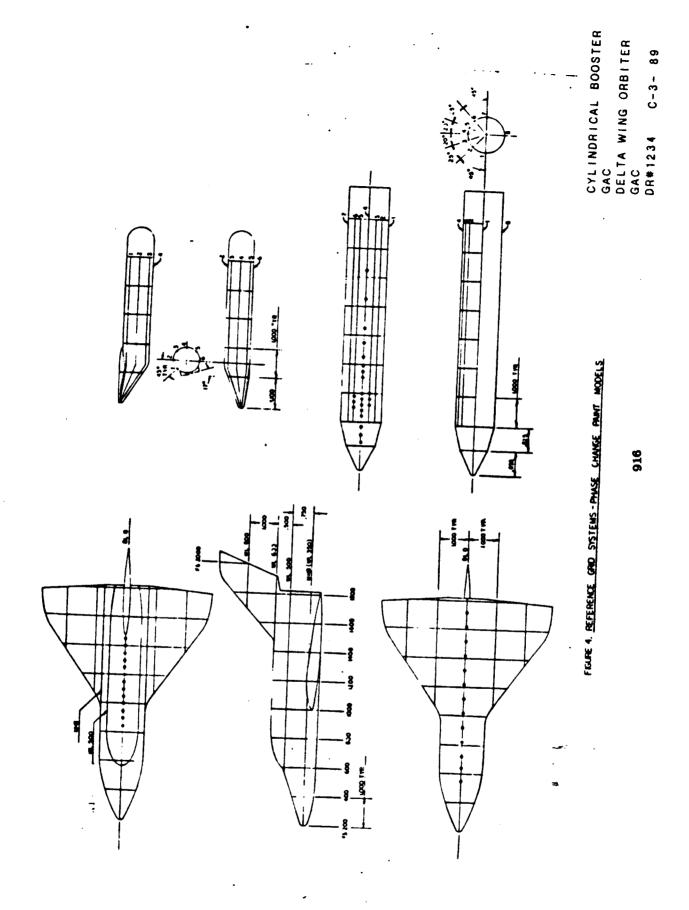


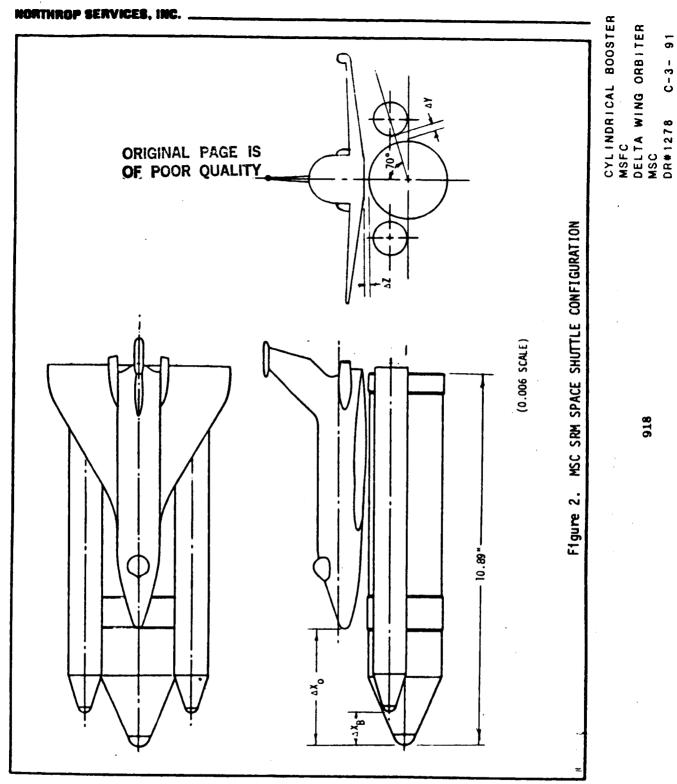
FIGURE 2. ORBITER THERMOCOUPLE LOCATIONS (LOWER SURFACE)

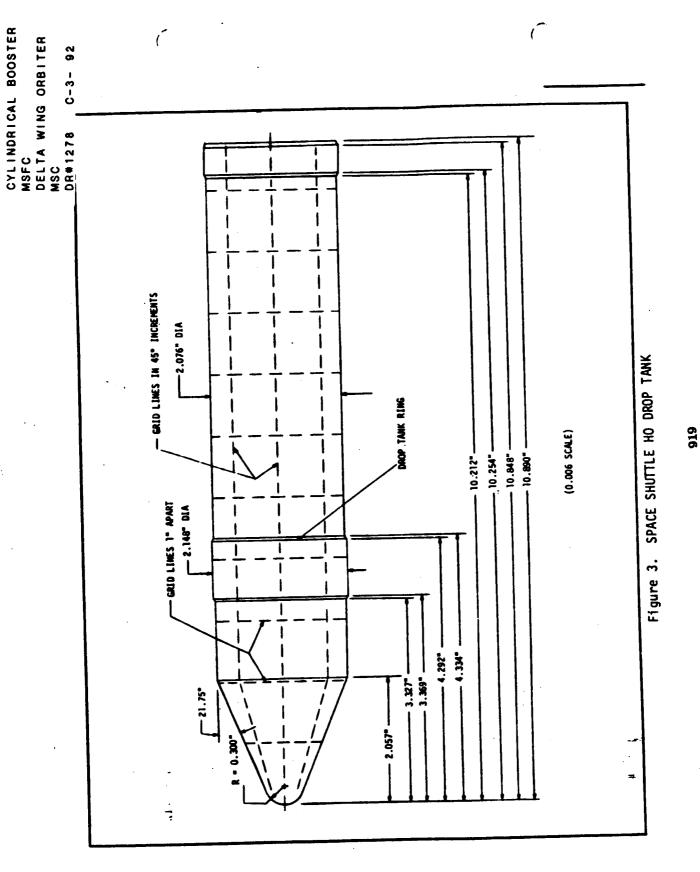
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	DATE	5//5	5/15	5/15 5/15	5/16	5,76	2/19	5/16	5/16	5/16	5/1/3	20,5	5/1/2	5/1/2	25.5	5/18	2.5 8.5 8.5	2/18	2/18	5/38 5/38		5.5	5//5	<u> </u>	51/5	5/19	61/3
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	INITIAL TEMP.	- ;	28	26	87	85	88	- &	88	6 6	22 SE	8	88	36	92	83	8	26	<b>3</b> 8	886	S 88	88	888	8 8	86	86	98
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TABLE 1.

1.1

PHASE CHANGE COATING TEST DATA BUNDARY SHEET

Heating Else en 11 and Ecaty lang TEST TITLE: Lawscharher M

TEST NUMBER: 708

TEST FACILITY: 422

TEST ENGINEER: L'House TEST DATE: No. 3-10, 1972

2														
Š	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp.	Taw • Ttotal	RNX 106 Ft		Mode (de	Model Position (degrees)	ittion 8)		Camera Location (in)	:
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3	\	7	,	325	1770	,	T.		1	1	1	+	4	1
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		1	,	2000 /	1450	1	1	1	1	ħ	†	4	1	Т
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7	7	1	1	_	,		†	2000	1	1	9	4	$\downarrow$	7
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e X	** X axis parallel to stream (4.4			325	1	7	1	125	1	1,	1	ŀ	L	_
<b>d</b> >> €	Y axis (+ right, - left, as viewed from the rear)	i, -upa 16 rear	tream) )		<b>T</b>	w : adi	Taw : adiabatic wall temperature	temper	ature	1	1	4		7

allel to stream (+downstream, -upstream) 

Z axis (+up, -down)

\*\* 118 model mounted upright gives foo; nose up with respect to gives also

CYLINDRICAL BOOSTER TBC DELTA WING ORBITER GAC DR#1261

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TABLE 1. (Continued)

PHASE CHANGE COATING TEST DATA BUMMARY SHEET

TEST TITLE: /areshark:Ed

TEST FACILITY: LARC M. 6 TEST NUMBER:

TEST DATE: Mac 3-10 1472 TEST ENGINEER:

No.	Model Configuration identification	Model Scale	Free Stream	Total Pressure (psia)	Total Temp.	Taw • Ttotal	RNX106 Phase Ft Change	Phase Change Temp.	Mode (de	Model Position (degrees) x x x x		Camera** Location (in)	era ution	: .
			Number				(Money)	(OF)	8	9	Ð	×	2 7	
100	18.5.V.T.	2200	1.3	22.72	2111	1.0	01	32.0	Ŋ,	र	0	Z	7	3
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	1	1	1.8	7	1440	1	10	150	1	1	0	7	7	T
1	\	1	1	2222	1465	1	1	1	1	1	180	7	┪	T
	,	1	7.85	320	1	1	1.65	200	<b>1</b> )	1	0	1	1	П
,	,	1	1.9		1465	1	10	222	1	٠	1	十	4	T
		١	1	ZC.Zs-	5211	1	7	150	1	1	1	一	1	
	,	Į,	7.83	27.0	1505	,	1.45	/25	1	1	١	7	귂	
1		,	6.1	2530 1525	1275	7	10	150	1	1	135	7	#	T
	,	,	7.65	225	1305	'	7.65	1725	1	1	1	1	#	
7.5	1	1	1	1	1320	1	1	١	0	1	1	1	⇈	T
	Edoremo homisokre	1	١	,	1325	١	1	400	7	1	0		竹	
268	1	1	1	350	1330	•	١	1.50	1	١	·		ᅦ	7
×	axis parall	am, -u	pstream)		•	Taw :: a	* Taw .: adiabatic wall temperature	all temp	eratu	٤				

\*\* X axis parallel to stream (+downstream, -upstream)

Y axis (+right, -left, as viewed from the rear)

Z axis (+up, -down)

923

1/2

### TABLE I. (Continued) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

Heeling Later on 181 and Town TEST TITLE: Jaiestischen

·

TEST NUMBER: 208 TEST FACILITY: 44 86 111-8

TEST DATE: Mar 3-10, 1972 TEST ENGINEER: 1 14

Rus														
, 0,	No. Model Configuration identification	Scale	Stream Mach	Total Pressure (psia)	Total Temp.	Taw *	RNX 106	Phase Change Temp.	Mo	del Posit (degrees) x x x	ifflon ()	Came Locati	Camera Location (in)	: .
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2,	110	1	0.0	1073	N/	1	1.8	250	1	1	1		1	_
	171018	1	1527	2.20	12.5	1	1,65	150	1	1	1	t	+	Т
	`	,	1	1	1305	1	,	3	,		T	t	╀	T
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ফ্	1	1	1	257.55	14.20	,	╁╌		+		1,	╁	4	Т
2	7	1	1	† <del>.</del>	1,22	Ţ		0=1	+		2	+	<del>,</del>	1
26.42	1	,	20.00	1	1	1	1	25.0	1	1	1		+	
x x	** X axis parallel to stream (+downstream			7	13/0	1	163	150	5	1	0		+	_

\* Taw .: adiabatic wall temperature \*\* X axis parallel to stream (+downstream, -upstream) Y axis (+ right, - left, as viewed from the rear)

Z axis (+up, -down)

ou ship = of a CYLINDRICAL BOOSTER TBC Delta Wing Orbiter Kunsk-ss were ma \* \* \*

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DR#1261

#### TABLE 1. (Continued)

# PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Janesharha

TEST FACILITY: L.RC TEST NUMBER:

TEST ENGINEER: TEST DATE: 1/ac 2-10 1972

							7				,	1		:
No.	Model Configuration identification	Model Scale	Free Stream	Total Pressure	Total Temp.	Ttotal	RNX 10°	Phase Change Temp.	Mode de	Model Position (degrees)	9 0	Location (in)	tion (	
			Number	į			(Sem)		8	0	ø	×	2 /	
Ì	D.S.V.	5300.	28.7 580	925	5221	1.0	1.65	03/	<i>'</i> '	0	180	7/1/2	4	250
	11000	1	1.0	5152	1430	١	0.01	1	•	1	0	-	7	1
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		,	7.65	325	1300	-	511	150	-3	1	1	┪	ᆌ	- 1
		1	,	\$25	1340	1	1	700	1	1	1	┪	ᅱ	ı
3		1	,	220	-	1	١	150	1	1	057	1	ᅦ	ı
		,	13	25.20 1420	1420	١	120	7	1	l	,	_	+	
3		ľ	,	25.20	12.7	1	١	0,2	1	1	0			1
3		,	١	,	2001	i	١	150		1	721		+	ı
32		ŀ	1	22570	0451	-	1	300	1	1	1		ᅱ	ŀ
		L	7.85	320	1255	~	1.65	200	0	1	150	寸	┧	
	,	,	7	١	1525		1	400	1	,	1	一	╫	. I
	,	1	13	5252	H30	•	10.0	1	\	,	I		ᅱ	. 1
							. adiabatic wall temperature	rail temn	profil	9				

- a recordery compliquention on string at 75°

TABLE 1. (Continued)

PHASE CHANGE COATING TEST DATA BUICARY SHEET

Harting Lies on UV and Bourber bon TEST TITLE: Jawechga hea e

TEST FACILITY: LORE MIS 8 TEST NUMBER: 28%

TEST ENGINEER: TEST DATE: Nac 3-10, 1972

No. Model Configuration		Model	Free	Total	Total	Town	DNVIO				t	1	
	Sca	0	Stream Mach Number	2	Temp.	Ttotal	PA PA	Change Temp.	Model ,	Model Position Camera++ (degrees) Location	8	Camera Location	r gor
REV		7					(10a)	(PF)	8	0	0	X	2
	3	1	13	-22 NA 22-		7.0	7 4	1	$\parallel$	#	#	#	$\parallel$
7	1	_	25%	1			0.0	000	0	0	150	10	1.
	١,	-	1	+	2/5/	1	1	017	9/-	-	ı	-	
7	1	₩		Т	13/2	1	,	500	1	1	1	Ľ	L
		1	T	00%	1	1	1	1	. 01	-	1	Ľ	L
	1		1	1	1	1	1	900	╀	'	+		
	1		ì	2555	14.25	1	12.0	,	1	╀	+,	T	$\int$
	1		1	277.72	1350	1	1	560	1		+	$ \downarrow $	
	T		1	1					+	╀	+	Ţ	
	1								╀	+	╀	Ţ	T
	1					-		$\dagger$	+	+	+	I	1
					H	t	f I	$\dagger$	+	+	4		
		1		$\mid$	t	$\dagger$	†	1	$\dashv$	$\dashv$	-		
		╄	$\dagger$	$\dagger$	$\dagger$	7	1				L		Γ
				•									•

\* Taw .: adiabatic wall temperature \*\* X axis parallel to stream (+downstream, -upstream)

Y axis (+ right, - left, as viewed from the rear)

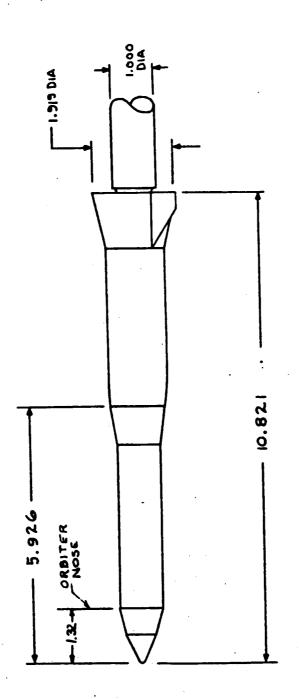
xxx /Al made / mounted Z axis (+up, -down)

CYLINDRICAL BOOSTER 64 junes 4 < 0

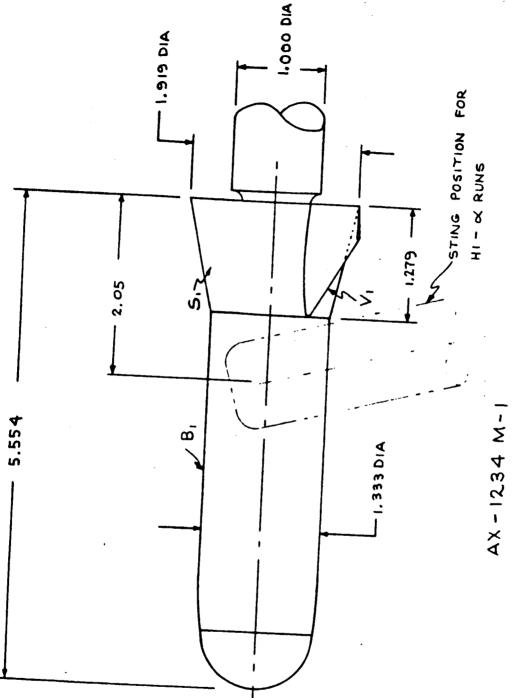
DELTA WING ORBITER DR#1261 TBC

C-3- 99

CYLINDRICAL BOOSTER TBC DELTA WING ORBITER GAC DR#1261 C-3- 100



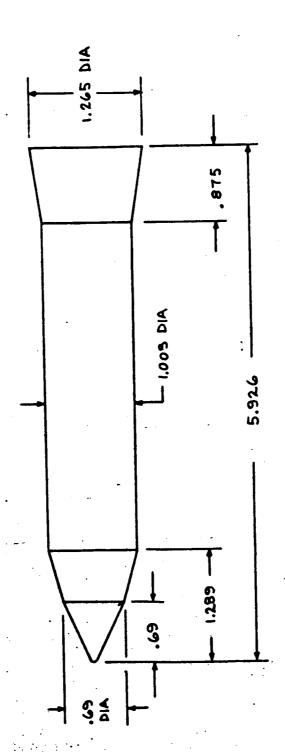
BOOSTER - TANK ASSEMBLY; B, S, V, T, FIGURE 4. BOOSTER-TANK ASSEMBLY DRAWING AX - 1234 M-1



-

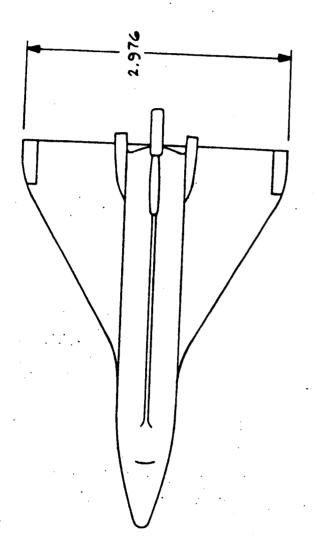
BOOSTER ASSEMBLY ; B, S, V,

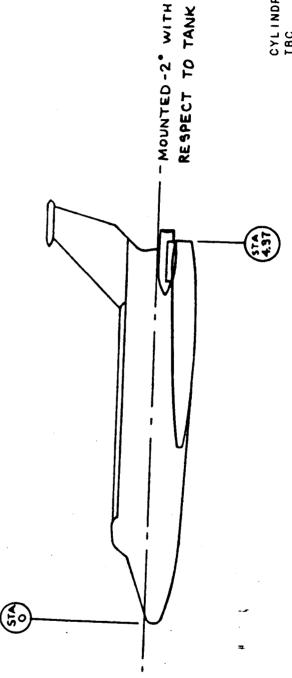
FIGURE 5. BOOSTER ASSEMBLY DRAWING



AX - 1234 M - 1 ORBITER TANK; T,

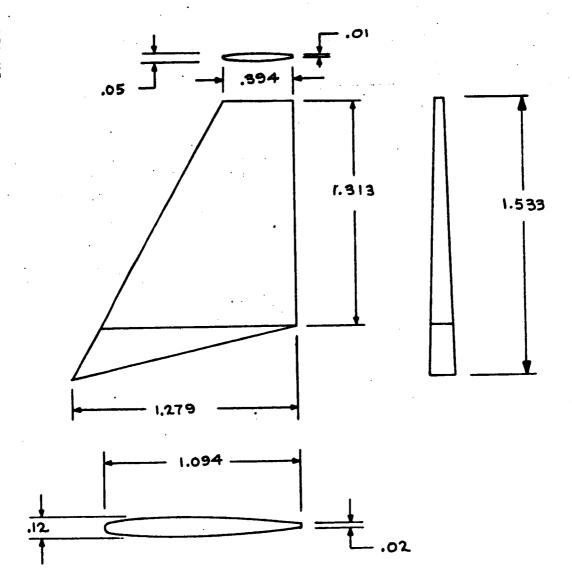
FIGURE 6. ORBITER TANK DRAWING



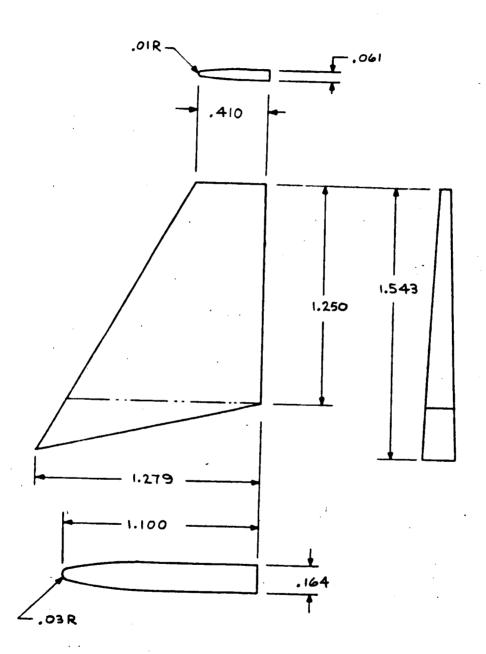


AX-1234 M-1

040 A ORBITER; O



AX-1234 M-1 SCALE FIN; V, FIGURE 8. SCALE FIN DRAWING



AX-1234 M-1

FIN; V

FIGURE 9. TEST FIN DRAWING

TABLE

TBC THIN SKIN THERMOCOUPLE TEST DATA SUMMARY SHEET

UNIQUE CONFIGS. ORBITER

CYLINDRICAL BOOSTER

C-3- 106 DR#1178 GAC

RE-ENTRY HEAT TRANSFER TO ORBITER SURFACES AND INFERFERENCE HEATING DURING LAUNCH, BOOST AND HIGH ALTITUDE ABORT RE-ENTRY

TEST FACILITY: NAUA/LIC 31 INCH-CHIFF 3 TEST NUMBER: TEST TITLE:

A. D'Errico TEST ENGINEER: TEST DATE: June 2-11, 1971

Camera. Location Model Position Ð 0 (degrees) 5 4 0 · Taw :: adiabatic wall temperature +10 450 5 4 0 b 0 Change Temp. Phase (POF.) N/A RNXIO ₹. .95 86. ₹. ŧ6. ₹6. 8 8 95 2 4 4 8 Ft Taw . Ttotal 1.0 Temp. Total 1013 1842 1846 1846 1840 1800 1818 1844 1838 1821 1854 1834 1837 Pressure (psta) Total 750.0 753.3 753.6 753.9 753.5 755.0 753.4 753.1 745.2 750.5 749.4 754.7 748.1 Number Stream 10.35 Mach Free Model Scale .0067 Model Configuration Identification (0)3 Ts (B)2H (D)3 A7 T5 (11):11 (0):1 14:14: Run No. 9 12 15 9 13 16 17 0 10 71 Ø

\*\* X uxls parallel to stream (+downstream, -upstream) Y axis (+right, -left, as viewed from the rear)

Z axis (+nb, -down)

RECENTIFY THAN THANGE TO OFFICE THE CONTRACT AND TAMBELED FOR THIN SKIN THERMOCOUPLE TEST DATA SUMMARY CHEFT

TABLE 4 (CONTINUED)

TEST TITLE: HEATING DURING LAUNCH, BOOST AND HIGH ALTITUDE ADORT RE-ENTITY

TEST FACILITY: NASA/LRC 31 INCH-CFHT A. D'Errico 69 TEST NUMBER:

.

TEST ENGINEER:

TEST DATE: JUNE2-11, 1971

Camera \*\* location Model Position Ð (degrees) Ø 4 8 4 0 -;` 4 -5 0 0 Phase Change Temp. (<sup>0</sup>F.) N/A RNXIO 6. 96. 95 8 96. .95 96 Ξ. 99 .98 98 .6 .97 Ft Taw \* Temp. Total (E) 1798 1819 1823 1829 1813 1818 1828 1.0.1 1803 1817 1824 1821 1807 Pressure (bsia) Total 753.6 2,642 750.2 749.4 751.6 749.0 750.3 754.2 0.14.7 750.5 7.457 753.1 753.1 Number Stream Mach Free 10.35 7900. Run Model Configuration Identification Scale (B)2H (0)3 A11 T5 (B)2H (0)3 A12 T5 (B)ZH (O)<sub>3</sub>A<sub>10</sub> T<sub>5</sub> (B) 2H (O) 3A8 T5 (B)71 (0) Ap Ts (0) 9 82 8 32 22 3 92 27 ... 25 2 ₹

\*\* X axis parallel to stream (+downstream, -upstream) Y axis (+right, -left, as viewed from the rear)

adiabatic wall temperature

. Taw

Z axis (+up, -down)

UNIQUE CONFIGS. ORBITER GAC CYLINDRICAL BOOSTER C-3- 107 DR#1178

TABLE 4 (CONTINUED)

CYLINDRICAL BOOSTER TBC

UNIQUE CONFIGS. ORBITER

C-3- 108 GAC DR#1178

TEST TITLE: HEATING DURING LAUNCH, BOOST AND HIGH ALTITUDE ABORT RE-ENTRY THIN SKIN THERMOCOUPLE TEST DATA SUMMARY SHEET RE-ENTRY HEAT TRANSFER TO ORBITER SURFACES AND INTERFERENCE

TEST FACILITY: NASA/LRC 31 INCH-CFRT \$ TEST NUMBER:

TEST ENGINEER: A. D'Errico June 2-11, 1971 TEST DATE:

							*		Model	Madel Desition Camera.	luoi	Jame	ra	-
Run No.	Model Configuration Identification	Model Scale	Free Stream	Total Pressure	Total Temp.	Ttotal	E TE	Change Temp.	ep)	(degrees)		Location (in)	ion	
			Mach	(psia)	(31.)			(PF)	8	0	0	XX	2	
			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,							$\parallel$	$\parallel$	╟╌	$\!$	1
-		2006	36 01	7 00 2	1798	1.0	66	N/A	9	d	4	+	4	Т
34	(0)3			6 6 6	3,700		80			-5	듸	$\dashv$	_	7
35			1	27.7	22.7		75			+5				
36			1	757.8	2201	$\frac{1}{1}$	Ž.		·	,	F	$\vdash$	H	
2	•			754.4	1823		.97	1	3	<b>;</b>	‡	$\dagger$	╀	T
۽ ام		L		751.8	1807		86.		ଷ୍ଟ	7	7	$\dagger$	+	T
ရှ		$\frac{1}{4}$		6 132	3,803		86.		27	-5		-	4	٦
36		1		121.3	301	1	9	L		c		_	-	
4				749.3	1803		86.		1		Ŧ	†	+	T
<b>⊋</b>		L		750.8	1814		.97			÷	7	+	+	T
<b>=</b>		$\downarrow$		751.2	1812		.97		-5	0	$\exists$	7	$\dashv$	
알		$\frac{1}{4}$	+	754.2	1813		8.		0	-5				
<u>T</u>		1	$\frac{1}{1}$	1 152	1837	-	56.			0				
∄		1	1			1	8	+	丰	\$		Ī	╁	
1,1		_		751.4	1021	-	ς.	1	†	·	1	1	$\dagger$	
北		-	_	750.2	1816	-	.97		4	7	1	1	┨	1
<b>₽</b>		1				1	adiabatic wall temperature	vall tem	peratu	re				
×	** X axis parallel to stream (+downstr	eam, -	downstream, -upstream)	_										

X axis parallel to stream ( Yaxis (+right, - left, as viewed from the rear)

Z axis (+up, -down)

(

THIN SKIN THERMOCOUPLE TEST DATA SUMMARY SHEET RE-EMINY HEAT TRANSFER TO ORBITER SURFACES AND INTERFERENCE

TEST TITLE: HEATING DURING LAUNCH, BOOST AND HIGH ALTITUDE ABORT RE-ENTRY

TEST NUMBER: 69

-

TEST FACILITY: NASA/LRC 31 INCH-CFHT

TEST DATE: June 2-11, 1971 TE

TEST ENGINEER: A. D'Errico

Camera .. location (in) 1 Model Position C Ð (degrees) 0 C ÷ Ş 0 b 2 4 50 9 9 8 5 Change Phase Temp. (<sup>O</sup>F) N/A RNXIO ゟ゙゚ .95 1.03 1.10 1.07 76. ġ. 1.06 1.09 .95 ፫ Ttotal Taw . 1.0 Temp. Total 1828 1749 18421833 1849 1756 1728 1811 1777 1737 Pressure (psia) 771.2 Total 748.3 7(3).5 750.6 751.8 761.9 768.0 751.3 753.8 777.1 Number Stream Mach Free 10.35 Model Scale 1900 Model Configuration Identification  $(0)_{3}$ Run No. 5 20 3 52 **7**5 52 8 42 7 57

Y axis (+ right, - left, as viewed from the rear)

\* Taw .: adiabatic wall temperature

Z axis (+up, -down)

936

CYLINDRICAL BOOSTER TBC Unique Configs. Orbiter GAC

C-3- 109

DR#1178

CYLINDRICAL BOOSTER TBC

UNIQUE CONFIGS. ORBITER GAC DR#1178 C-3- 110

OIL FLOW TEST DATA SUMMARY SHEET

TABLE

TEST TITLE: HEATING DOING AND HIGH ALTITUM ADORT IN-ENTIT

TEST FACILITY: NASA/LRC 31 INCH-CENT 8

TEST NUMBER:

·

TEST ENGINEER: A. D'Errico TEST DATE: June 2-11, 1971

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach	Total Pressure (psia)	Total Temp. ( <sup>O</sup> R)	Taw * Ttotal	RNX 106 Ft	Phase Change Temp.	Mode (de	Model Position (degrees)	ition i)	Camera** Location (in)	era ition	: .
			Number					(OF)	8	0	Ð	×	Zλ	$\Box$
55	(0) <sub>2</sub> T <sub>5</sub>	7900.	10.35	750	1820	N/A	1.0	N/A	0	0	0		$\vdash$	
9												$\vdash$	-	
19				_		-			01	-	~			
													├─	
													$\vdash$	
													_	
													-	
													-	Γ
× × ×	** X axis parallel to stream (+downstream, -upstream) Y axis (+right, -left, as viewed from the rear) Z axis (+up, -down)	ownstream, -upst ed from the rear)	pstream) ar)		,	Taw ::	• Tgw :: adiabatic wall temperature	all temp	eratu	စ္				

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

RE-ENTRY HEAT TRANSFER TO ORBITER SURFACES AND INTERFERENCE HEATING DURING LAUNCH, BOOST AND HIGH ALTITUDE ABORT RE-ENTRY TEST TITLE:

TEST FACILITY: NASA/IRC 31 INCH-CINT 8 .. TEST NUMBER:

TEST DATE: June 2-11, 1971

A. D'Errico TEST ENGINEER:

Camera\*\* Location in i Model Position RWD LWD RMD T. Ð (degrees) adiabatic wall temperature ४ 10 0 2 C Change 250 125 LT 359 LT 250 150 RT RNX106 Phase Temp. 250 150 150LT (<sup>O</sup>F) 325 150 150 150 150 250 150 125 ፫ Taw + 1.0 + Taw Temp. Total (R) Pressure (psia) Total \*\* X axis parallel to stream (+downstream, -upstream) Stream Number Free Mach 10.35 Model Configuration identification Scale 7900. (0) A10 I5 (B)2H (O)3 A8 T5 (0)<sub>3</sub> A<sub>7</sub> T (e) (0)  $(B)_{2H}$ (B)2H Š. Run 20 65 જી 88 8 92 ₫ Z<sup>t</sup>

RWD = Right wing down
LWD = Left wing down
LT = Left tank
RT = Right tank

Y axis (+ right, - left, as viewed from the rear)

Z axis (+up, -down)

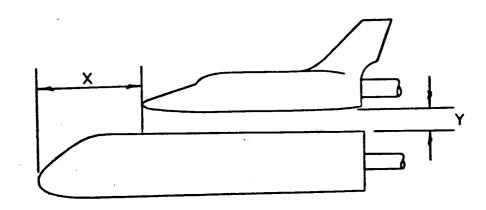
UNIQUE CONFIGS. ORBITER CYLINDRICAL BOOSTER DR#1178

C-3- 111

## CONFIGURATION TESCRIPTION (CONTINUED)

The attachment points designated by  $A_{\underline{x}}$  were as follows:

CYLINDRICAL BOOSTER TBC UNIQUE CONFIGS. ORBITER GAC DR#1178 C-3-112



X(IB)	$\overline{\lambda(IR)}$	ORBITER-BOOSTER ORIENTATION
4.286	.160	belly to back
3.006	.160	belly to back
4.286	.080	belly to belly
4.286	.160	belly to belly
3.006	.160	belly to belly
4.286	0	belly to belly
	4.286 3.006 4.286 4.286 3.006	4.286       .160         3.006       .160         4.286       .080         4.286       .160         3.006       .160

DELTA WING BOOSTER

07/Q5

DELTA WING ORBITER NR DR#1032 C-3- 113

# Phase-change-coaling test data summary sheet

Space Shuttle Booster/Orbiter Mated-Model Heat Transfer Wind Tunnel Runs TEST TIFLES

Mach 8 Variable Density

TEST NUMBER: 187-146, 189-192

- TEST FACILITY; Hypersonic Wind Tunnel

TEST DATE: 18, 25 August 1970

-TEST ENGINEER; W. R. Ginsky/R. Raparelli

یا											•			
No.	Model Configuration Identification	Model Soale	Free Stream Mach Number	Total Total Pressure Temp. (paia) (*R)	Total Temp. (*R)	Taw* Ttotal	RNX10 <sup>6</sup> Ft	Phase Chango Temp.		Model Position (degrees)	Itlon	S S S	Camera•• Location (in.)	: -
_	B11/01 (Reseline Orbital							(3)	Ö	8	8	×	Y 2	~
ŀ	Contract Contract Position)	.0035	7.84	265	1302	6.0	1.353	250	2	:	1	-	#-	П
7	B11/01 (Baseline Orbiter Position)		7.84	265	1357	-	1 000		> -	5 -	5 -	+	+	T
۳	B11,01 (Aft Orbiter Position)		7.84	265	1395	F	1.203	120	1	7	7	+	+	
4:	B11/01 (Fwd Orbiter Position)		7.84	306	2000	-	1.210	200	1	7	7	$\dashv$	+	Ì
2	B11/01 (Fwd Orbiter Position)		, 9k	900		1	1.217	200	#	7	7	+	$\dashv$	$\neg$
و	B11/01 (Aft Orbiter Position)		3	930	14.30	1	4.198	300	7					
2	B11/01 (Becelfing Outile	T		365	1495	+	3.808	300	_	_			_	
L.	bit /o (in the Croller Position)	1	7.95	955	1470		3,873	300				+	-	Γ
٥	Bar /o. (Baseline Orbiter Position)	7	7.95	965	1460		3.957		1	T	1	+	+	T
	States (Baseline Orbiter Position)	1	7,84	266	1380		1,231	T		1		+	+	T
=	BIL/02 (Baseline Orbiter Position)	1	7.84	265	1385		1.224	150		İ		-	1	T
1	B11/02 (Baseline Orbiter Position)	1	7.95	955	1535		3.612	250		1		+	+	Т
27	B11/02 (Baseline Orbiter Position)		7.84	265	1335		1 200	T		#	#	+	+	T
13	B11/02 (Baseline Orbiter Position)	-	7, 95	945	1515	-		T	;	\$	+	+	4	٦
Xaxi	X axis narullal to et accept the desired						3.050	250	-2-	_	-		_	_

\*\* X axis parallel to atream (+ downstream, - upstream) Y axis (+ right, - left, as viewed from the rear)

2 axds (+ up, - down)

\* Taw = adiabatic wall temperature

DELTA WING BOOSTER 3/Q5

DELTA WING ORBITER C-3- 114 DR#1032

PHASE-CHANGE-CO. ING TEST DATA SUMMARY SHEET

Space Shuttle Booster/Orbiter Mated-Model Heat Transfer TEST TITLES

Mach 8 Variable Density Wind Tunnel Runs

193-205

TEST NUMBER:

TEST FACILITY: Hypersonic Wind Tunnel

TEST ENGINEER: W. R. Ginsky/R. Raparelli 26, 27 August 1970 TEST DATE:

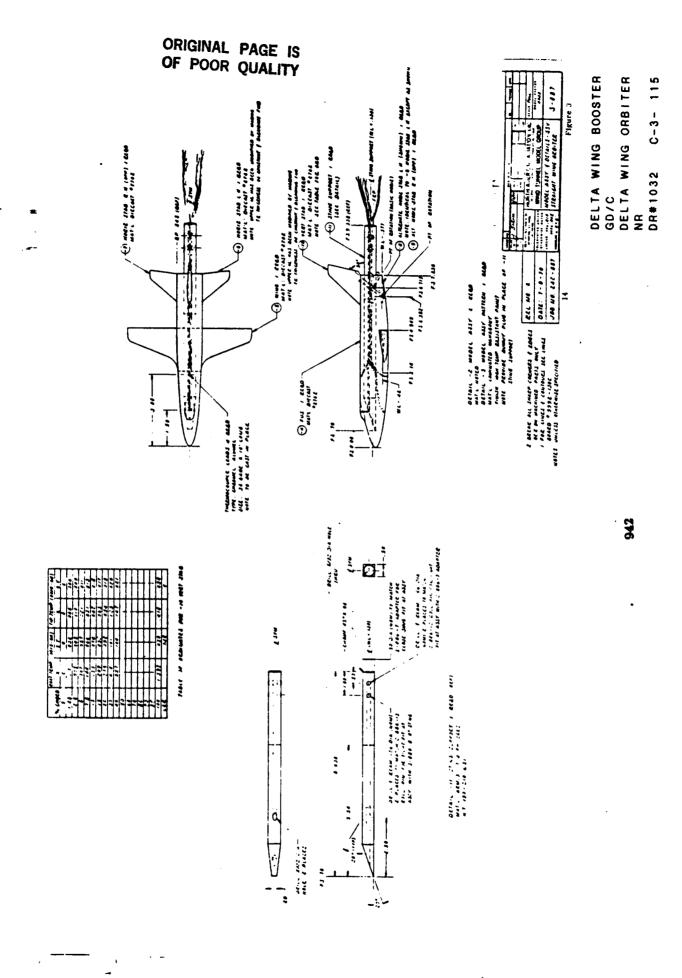
Run No.	Model Configuration Identification	Model Scale	Free Stream Mach	Total Total Pressure Temp.	Total Temp.	Taw* Ttotal	RNX10 <sup>6</sup> Ft	Phase Chango Temp.		Model Position (degrees)	Itton		Camera•• Location (in.)	
			Number	Ì				(*F)	ð	80	8	×	7	2
7	B2/02 (Baseline Orbiter Position)	.0035	7.95	965	1490	0.9	3.829	250	•0	0.	•0			
15	B2/01 (Baseline Orbiter Position)	_	7.95	. 296	1520	_	3.708	250	$\dashv$		$\exists$			
18	91		7.84	265	1365		1,253	125		_	$\dashv$			
17	01		7.95	965	1490		3,829	175			-		1	
18			7.84	265	1335		1.299	125		-	_			ł
19	02		7.95	965	1470		3.914	175	>		$\exists$		_	
20	. 20		7.84	265	1380		1,231	125	-2					ı
21	02		7.95	965	1485		3.850	175						
22	01		7.84	265	1405		1.196	125						
;	10		7.95	965	1495		3.808	175			$\exists$			
24	B11		7.84	265	1400		1.203	125						
25	B11		7.95	965	1500		3.788	175	>					
<b>5</b> 8	B11	<b>&gt;</b>	7.84	265	1385	>	1.224	109	•	>	<b>-</b>			

.. X axis parallel to stream (+ downstream, - upstream) Y axis (+ right, - left, as viewed from the rear)

Z axds (+ up, - down)

7

\* Taw \* adiabatic wall temperature



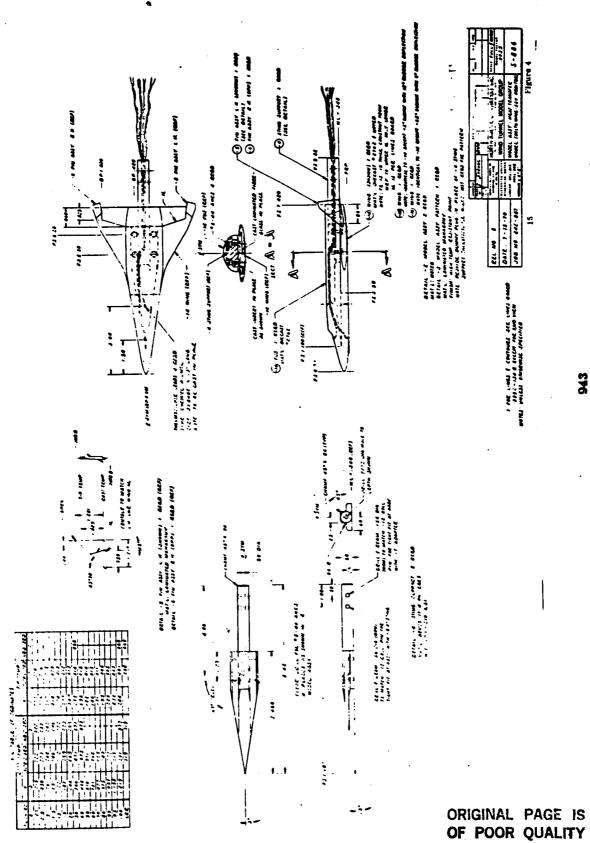


Figure 1.

SPACE SAUTHE BOOSTER HEAT TRANSFER MOKE STRAIGHT MING VERSION MODEL SCALE-00035

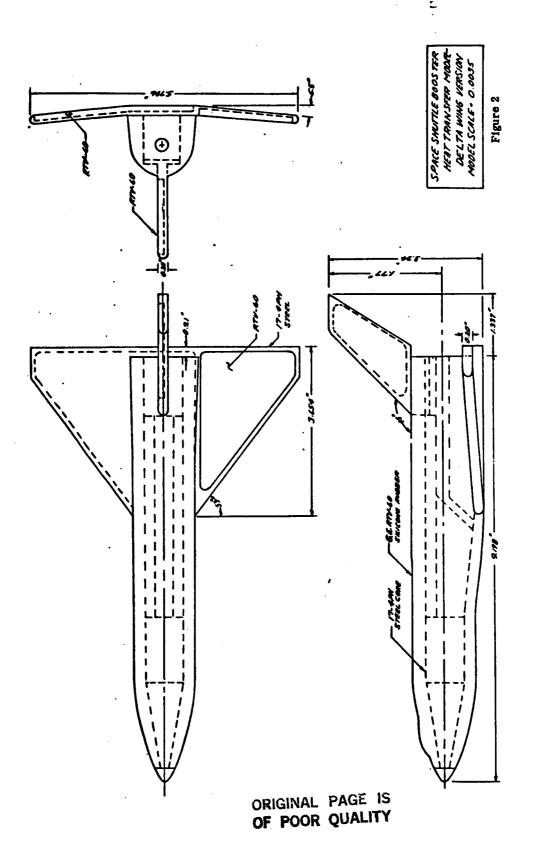


Table 16. Test Data Summary - Heat Transfer Runs

Point	ration	M	Po (psfa)	T <sub>o</sub>	Re- ×10-5/ft	(deg)	B (dua)	Position		
9/2	B2+O2	2.5	4918	722		7	(deg)		Gap (in.)	Remarks
9/3	1 55 55	2.5	4899	727	4.59 4.53	0	0	1.34	0.02	l <u>:</u>
9/4	1 1	2.5	2709	721	2.54	-5	.	1 1	11	· -
9/5		2.5	2715	715	2.56	0	1	1 1	1 1	
9/6	1 1	3.7	9589	721		-5	1 1	1 1	11	
9/7		3.7	9918	715	4.81	0			1 1	-
9/8		3.7	5041	714	2.49	-5	- I - i		11	
9/9	1 1	3.7	5013	709	2.50	0	1 1			
9/10	1 1	3.7	4994	705	2.50 2.51	0	1 1		7	Repeat of 9/8
10/2	1 1	2.5	4903	724	1	-5	1 1		0.02	
10/3	1 1	2.5	2690	716	4.56 2.54	0	1 1	i	0.14	
10/4	1 1	3.7	9912	717		-6	1 1	1		
10/6		3.7	5007	714	4. 86	0		· T	1	
11/2		2.5	4897	722	2.48	-5	1 1	1.34	0.14	
11/3		2.5	2672	715	2.57	0	1 1	0.0	0.02	
11/4		3.7	9960	714	2.53	-6	1 1		11 1	
11/5		3.7	5017	714	4.93	0	1 1	1	1 1 1	
12/2		2.5	4910	724	2.48	-5	1 1	0.0	111	
12/3		2.5	2686	725	4.56	0	1 1	2.5	11 1	
12/4	•	3.7	9929	719	2.49 4.86	-5	1 1	1	1 1	
12/5	B2+O2	3.7	5005	713		0	1 1	<b>.</b> T.	J 7	
13/2	B2	2.5	4922	724	2.48 4.57	-6	1 1	2.5	0.02	ļ
13/3		7,7	4693	724		0	1 1		-	1
13/4	1 1	- 1 1	2684	724	4.55	-6	1 1	-	-	I
13/5		2.5	2685	717	2.49	0	1 1	-	-	i
13/6	1 1	3.7	9808	715	2.53	-5	1 1	-	-	
13/7	!!	71	9874		4.85	0	1 [	-	-	Į.
13/8	• •	- ↓	5064	710	4.92	-5	1 1	•.	-	ł
13/9	B2	3.7	5035	707	2.54	0	1 1	-	-	
14/2	02	2.5	4914	723	2.53	-6	1 1	-	-	ì
14/3	7-		4905	726	4.58	0	1 1	-	-	
14/4		11	2680	723	4.54	-6	1 1	-	-	i
14/8	1 1	2.5	2682	721	2.50	0	1 1	•	-	
14/6		3.7	9906	709	4.94	-5	1 1	-	-	1
14/7			9905	709		0	1 1	-	-	1
14/8	•		4980	708	4.93	-5		-	-	j
14/9	02	3.7	4980	702	2.50	0	1	•	- 1	l
15/2	01	2.5	4905	722		-5	1 1	-	-	İ
15/3	<u> </u>		4905	720	4.58	0	1 1	-	- [	į.
15/4	-	11	2665	718	2.51	-6	1 1	-	-	
15/5	- 1 1	2.5	2686	718	2.53	0	! !	-	-	į
15/6		3.7	9905	717	4.85	-6	! !	-	-	
15/7		"	9905	718		0		•	-	
15/8	1 1			1	4.85	-5		-	-	1
15/9	01		4990 5000	713	2.47	0		-	-	
16/2	B2+O1	<b>•</b> 1		709	2.49	-5		-	-	- 1
	36,01	, ,	5017	710	2.49	0	.   1	1.43	0.02	ĺ
16/3 !			WWA ( I	713	2.48	-611	I		. 1	
16/3 16/4	B2+O1		2696	713	2.56		.	1 1	1 1	1

Table 17. Test Data Summary - Schlieren and Shadowgraph Runs

,				_ 1	Re.		,	Orbiter	Orbiter-	Rem	arke
<b>-</b> -	Configu-		Po	To	×10-6/	œ	B	Position	Booster		Shadow-
Run/Point	ration	M_	(psfa)	(°R)	ñ	(deg)	(deg)	(ia.)	Gap(in)	Schlie ren	graph
/630 & 631	B2	2.5	2550	610	3.0	0	0	-	-	Side View	No. 2
/628 & 629	B2	3.7	4790	1	1	1	1 1	-	-	Side View	No. 1
/635 & 636	B2	3.7	4790	1 1		1 1	1 1	-	-	Top View	I
/643 & 644	O2	2.5	2550	1 1	i	1	1 1	•	-	Side View	
/645 & 646	02	2.5	2550			1		-	-	Top View	1.
/639 & 640	<b>U2</b>	3.7	4790			1 1	l I	<b> </b>	-	Side View	No. 4
/641 & 642	O2	3.7	4790		1	li	1 1	۱ -	-	Top View	
/648 & 649	01	2.5	2550		li	11		l <b>-</b>		Side View	
650 4 651	01	2.5	2550		ı	1 1	1 1	-	_	Top View	No.34
/652 & 653	01	3.7	4790	1	ı	1 1	11	l -	l <b>-</b>	Side View	
654 4 655	01	3.7	4790		. 1	i 🛊	11		-	Top View	No. 6 & 7
671 4 678	B2+O1	2.5	2550	1 1	1	Ö	1 1	1.43	0.02	Side View	No. 11
672 & 677		2.5				-6	1 1	1		Side View	No. 12
673 & 676		2.5				-6	1 1	1 !	1 1	Top View	
674 & 675	1 1	2.5	2550			0	11	] ]	1 1	Top View	}
658 & 665		3.7	4790	1 1 1		0	1		1	Side View	No. 549
659 & 664		3.7	4790	1 1		-5	1 1	11		Side View	No. 10
5/660 & 663	1 1	3.7	4790			-6	11	1 .	1 1	Top View	100. 20
5/661 & 662		3.7	4790		1	0		1.43		Top View	i
•	1 1		2550		11		11	2.50	1 1	Side View	No. 13
3/680 & 683	1 1	2.5			11	0	1	li .		1	NO. 13
3/681 & 682		2.5	2550	1 1	1 1	0	1 1	2.50		Top View	
684 & 687	1 1	3.7	4790 4790	1 1	1	0	11	2.50	1 1	Top View	No.14&
3/685 & 686	1 1	3.7		1 1	11		11			Side View	No. 16
7/692 & 693	1 1	2.5	2550	1	1 1	1 -		0.0	1 1		70. 10
7/694 & 695	! ₩	2.5	2550	, ,	il	0	11	0.0	1 1	Top View	
7/696 & 697	_'	3.7	4790	1 1	1 1	0	11	0.0	l i	Side View	No. 17
7/698 & 699	B2+O1	3.7	4790		1 1	0	11	0.0	1 1	Top View	No.184
8/713 & 720	B2+02	2.5	2550	1 1	1 1	0	11	1.34		Side View	No. 23
8/714 & 719	1 1	2.5	2550	1	1 1	-6	11		1 i	Side View	No. 22
8/716 & 717	1 1	2.5	2550	1 1	11	0			1 1	Top View	l l
8/715 & 718	1 1	2.5	2550	1	11	-6		11	1 1	Top View	1
B/705 & 712		3.7	4790	1 1	11	0	11	11	1 1	Side View	No. 20
5/706 & <b>7</b> 11	1 1	3.7	4790		li	-5		11		Side View	No. 21
8/708 <b>&amp;</b> 709	11	3.7	4790	1. 1	1 1	0	11	Į ₹	1 1	Top View	
B/707 & 710	1 1	3.7	4790	11	1 1	-6	11	1.34	1	Top View	
17/2 & 3	1 1	2.5	2550	11	1 1	0	1 1	0.0	1 1	Side View	No. 24
17/4 & 5	1 1	2.5	2550	1 1	1	11	11	11	1 1	Top View	1
17/8 & 9	1 1	3.7	4790		11			1 1		Side View	No. 25
17/6 & 7	1	3.7	4790	1 1	1	1	11	0.0		Top View	i
18/1 & 2		2.5	2550	1 1 -	1 1	1 1		2.5	1	Side View	No. 264
18/3 & 4	1 1	2.5	2550	₩	₩	1 1	11	11		Top View	
18/5 & 6	[ ]	3.7	4790	1	1	1 1	Į V	1 1	1 1	Side View	No. 284
18/7 & 8	B2+O2	3.7	4790	610	3.0	م ا		2.5	0.02	Top View	No. 30

B2 = Delta Wing Booster, O1 = Straight Wing Orbiter, O2 = Delta Wing Orbiter

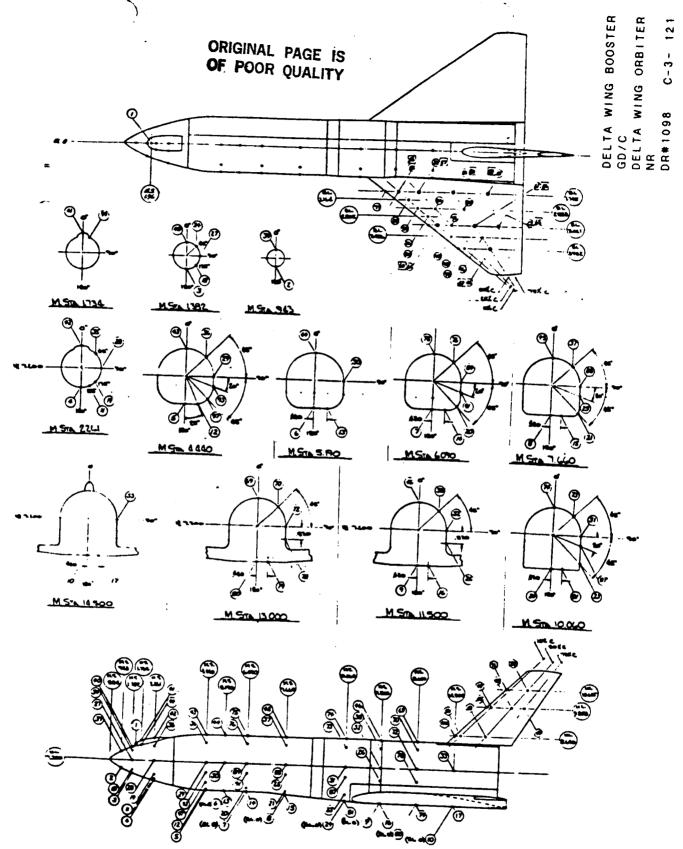
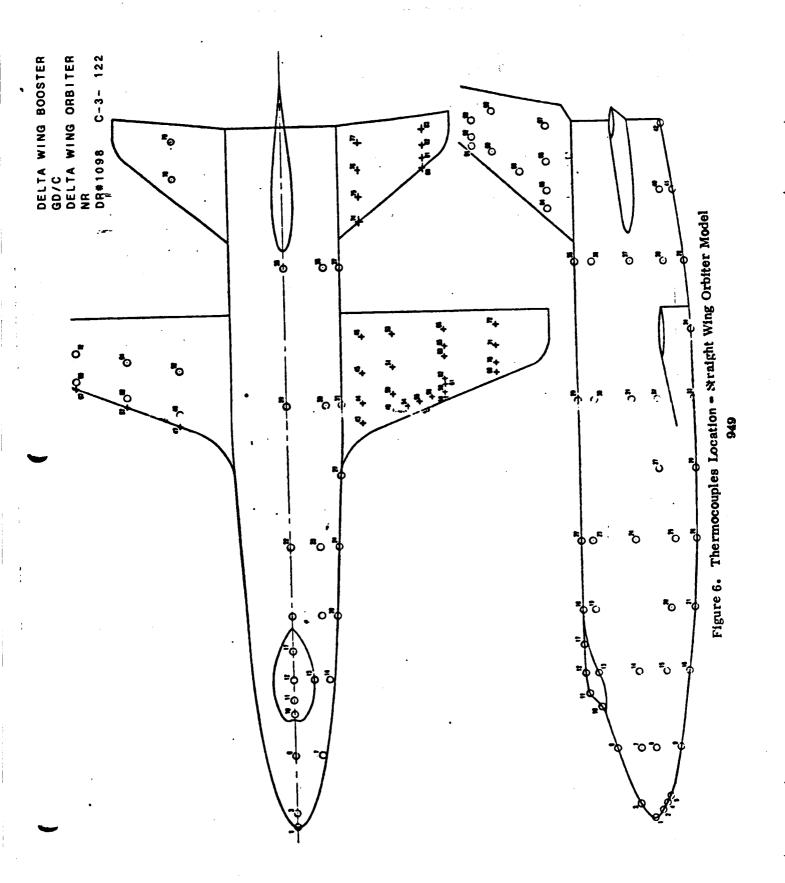
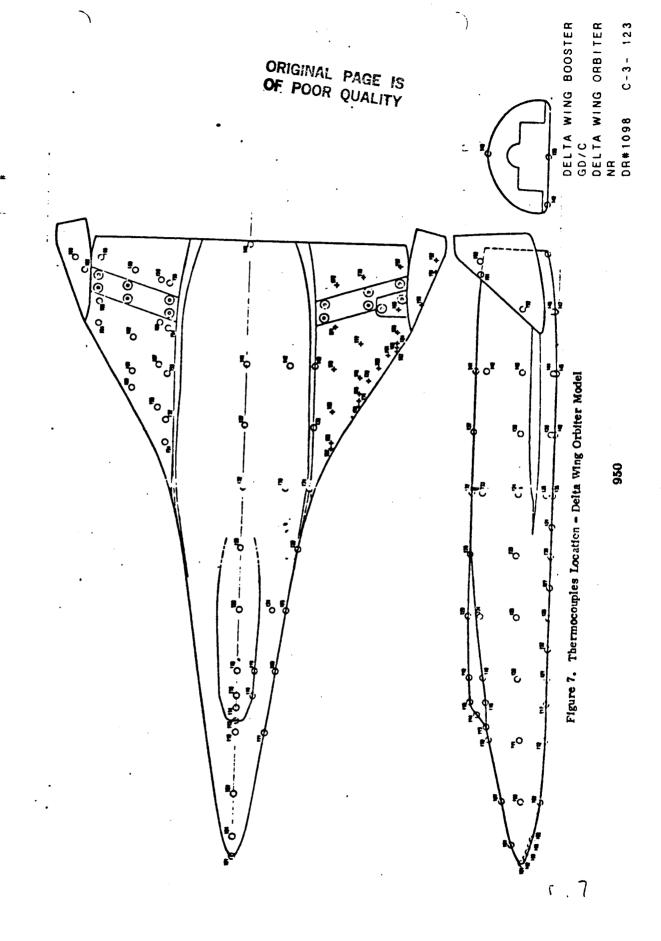


Figure 5. Thermocouples Location - Delta Wing Booster Model



ORIGINAL PAGE IS OF POOR QUALITY



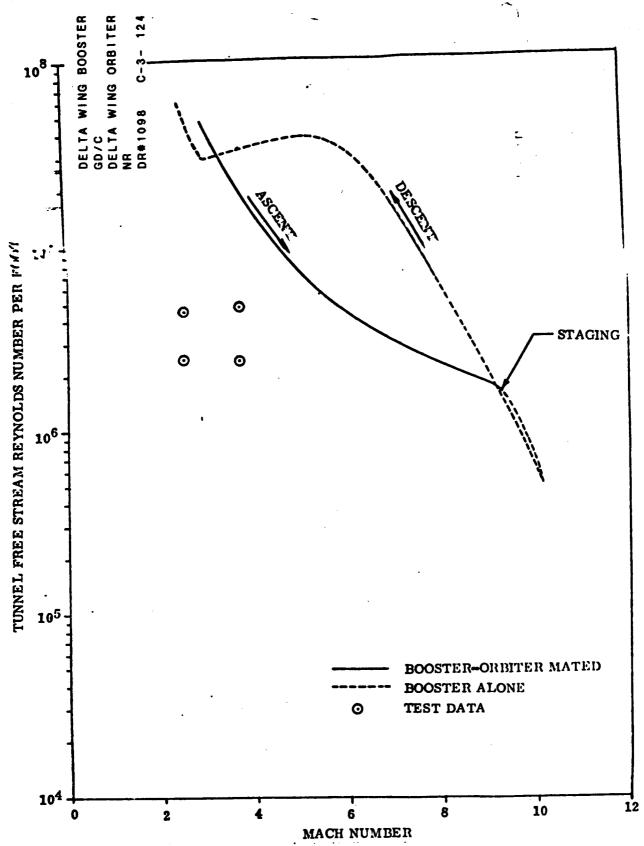


Figure 13. Space Shuttle Booster-Orbiter and Booster Mach Number and Reynolds Number Simulation (0.006 Scale Model)

DELTA WING ORBITER

126

C-3-

DR#1145

											_		_			_	_				_		_		_	_					_		_		٦	
arel.	3T./ft.Zees"		0.1366	0.1366	0.1357	0.0632	0.13%		0.0614	0.1361	0.1355	1567	7750	0.0531			C.1559	0.1492	0.1509	:	0.1560	0.1352	0.1567	101.0	0.1495	-	0.1500	201.0	0.155/	1671.0	0.1369	-	0.1124	91110	0.1210	
Test			6.5	<b>6.</b> 4	6.3	9.1	7.2	!	9.1				•	9.71	?		9.1		-	:	8.3	_	6.0	7.1	6.5		8.7	_		_	_	_	1.01	_	_	
I.e.			0.939	0.830	0.939	0.939	0.914		796.0	770			2	3 3	\$ 5	0.853	0.853	0.833		3	0.853	0.853	0.853	0.853	0.853	_	0.853	0.853	0.853	0.853	0.823		0.833	0.853	0.853	
	Side Top Bottom		~	~	~	~	~		•	. •	•	N (	N	7	~								٠													
	Top	Ī		-												~		. •	4 6	7	•			•	. ~	•	~	~	~	~	~		~	~	7	
	Side Top	-				_	_		_			_		_		_				_	-	• -		4 -			_	_	_		-		_	_	_	
	Pressure PSIA	Ī	1510	1510	0671	215	1465		-	261	1500	1490	1490	210	<b>8</b>	1500	201	1430	3	1525	1400		35	3	1505		1500	818	1685	1500	5691		818	825	1500	
lotal	ture.		938	970	596			200	-	219	926	920	925	019	\$11	070			32	22		250	3 3			3	960	Ş	200		2,70	?	068	915	96	
Phase	Change 1	-	957	90,	٤	**		2	. ;	2	550	8	200	350	2	036/96.	2007	150	138/350	175/350	į	23	103	1/2/420	103	136/30	350	35		136/360	2001	2	-	125	138	
Canard	Position der ##				•	5	3	•	(	21-	٠	•	2.	•	•	8	2.5	2	ş	٠ <u>٠</u>	;	Ŗ	• ;	91-	٠,	R.	5	? —	٠;	÷ 5	<b>?</b> :	21-	,	 —		_
1	Body		,			. {	5	•	,	8	•	•	g	•	•		•	•	•	•						•		•	•		•	•		•		_
Angle of	Attack,	OCK.	5	2.5	3 5	2 :	2	9		3	3	9	3	9	3		<b>9</b>	3	3	3		8	8	<u>چ</u>	8	8 	· -	2 :	9	g :	2	9	_	<b>-</b>	-	, _
Free	Stream	Hach No.		33			7.63	7.95		7.80	7.95	7.95	7.95	7.82	2.80		7.95	7.95	7.95	7.95		7.95	7.95	7.95	7.95	7.95		2.5	7.95	7.95	7.95	7.95			5.5	
	13/CE	i x	_;	:	?:	•	1.2	9.9		1.1	4				::		6.5	9.9	5.9	6		9.9	6.7	9.9	3.9	6.5	,	6.5	<u>~</u>	•.s	9:9	9.9		n .	, .	6.5
		ration "		٠.	<	<b></b>	_	٠		41		٠ -	٠,		امر د		<	-		. u	)	_	u	U	w	ပ —		ပ —	<b></b>	•	U	-	_	۵.	۵.	2
Spinor 1	Z.	Maber		1270	1721	1272	1273	1274		1275	7261	1273	1277	13.0	1280		1281	1282	1241	121		1285	1286	1287	1288	1289		1290	1531	1292	1293	1234		1295	1296	/621

A - 0.004-scale B-90 booster with slab canard (20° sting angle)
A0 - Mated booster/orbiter (0.004-scale B-90 with 161C orbiter: 20° sting angles)
A0 - Mated booster/orbiter (0.004-scale B-90 booster with concoured canard (40° sting angle)
C - 0.0031-scale B-158-2 booster (40° sting angle)
D - 0.0032-scale B-158 booster (5uselage only; no fairings, wings, or canard: 55° sting angle)
C - 0.004-scale B-90 delta wing (no fuselage or body flap: 40° sting angle)

•:

Mcanard angle of attack measured from freestream

'Bumbers following / indicate canard paint temperatures on all runs except 1245, where 138<sup>0</sup>F paint was used on sting. Thass-Change-Temperature is the temperature used for I<sub>wall</sub> in the calculation of h<sub>rel</sub>:

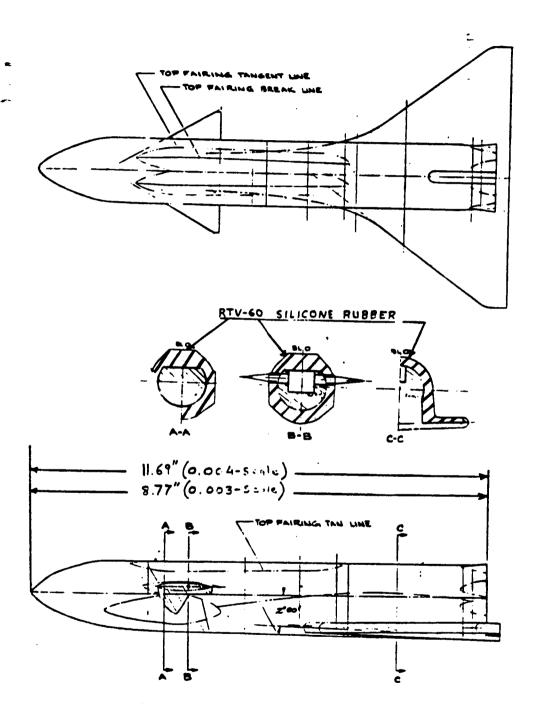


Figure 3 Space Shuttle Booster B9U Heat Transfer Model

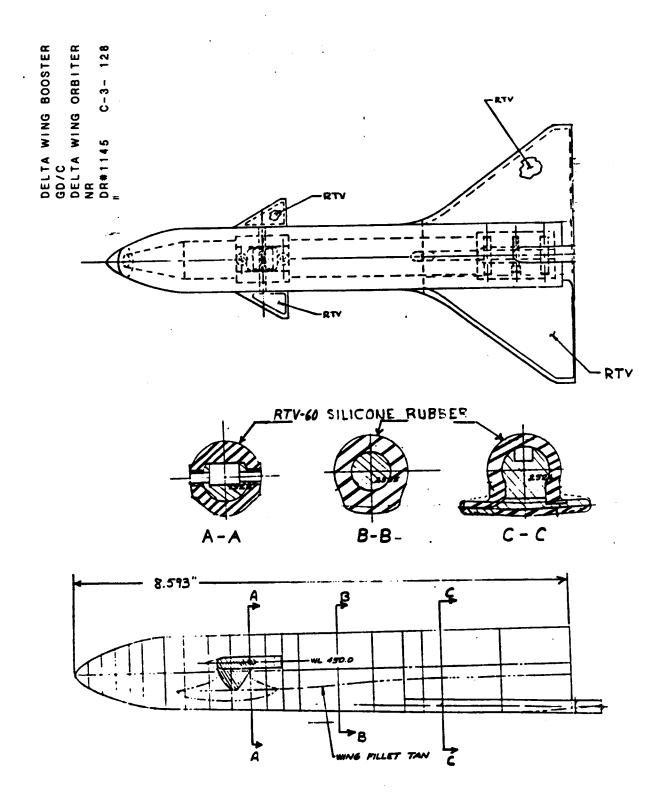
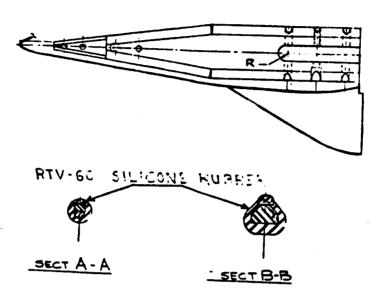


Figure 4 Space Shuttle Booster B-15B-2 Heat Transfer Model 955



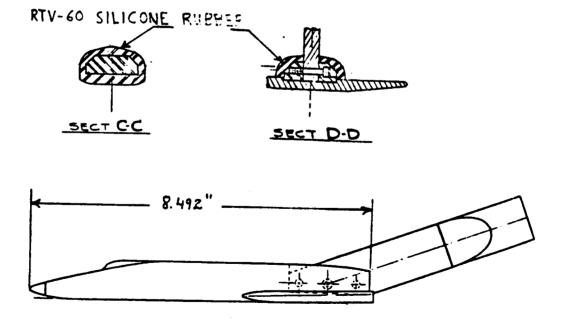


Figure 5 Space Shuttle Orbiter 161C for Mated Ascent Tests

Figure 7 Typical Heat Transfer Grid Model

TABLE 2

L

(

TEST CONDITIONS

TEST TITIE: AEDC-MSFC Phase B Heating Study - Thin-Skin Thermocouple Phase

TEST NUMBER: VI1162

TEST FACILITY: AEDC Tunnel 0

TEST DATE: May 26-29, 1971

TEST ENGINEER: W. R. Martindale & R. K. Matthews

3													•			
8.	Model Configuration Identification	ptific	ation	Model Scale	Free Stream Mach	Total Pressure	Total Temp.	Taw .	RNX106		Booster Orbiter	Booster- Orbiter	-	F. 52	Model Position	
		ος	ŷ		Number		:			P. P.						$\overline{}$
Ŀ	Doctor t O.Lite.	ŀ	٩								2	2		8	= =	1
1	pooster + Uroiter	2	3	.000	8.00	857	1339	1.00	3.75	¥	2.22	.234	Ē	0	0	Г
7						858	1347		3.72		L	F	F	+	+	Т
<u> </u>			$\exists$			356	1346		3.72	F	ļ.,	F	+	+	<u> </u>	7
•		$\exists$			·	658	1341		3.75		1.72	F	1	丰	7 0	T
م	·					859	1347		3.73		2 73	Ŧ	丰	‡	<u> </u>	T
، ا م						353	1338		3.76			1=	-	+	‡	T
$\cdot$					<b>-</b>	650	1346		3.73	F		Ĕ	<u> </u>	<u> </u>	+	Т
∞ .					7.93	149	12.49		0 74	-	T	233	十	<u> </u>	丰	T
2   5		$\exists$				148	1234		0.75		1		-	+	<u> </u>	_
2  :		$\Box$				151	1233		0.77		F	Ť	‡	<u> </u>		T
=	<b>*</b>		j		8.00	857	1342	F	3.74		1	Ŧ	-	<del>}</del> -	4 6	T
71	500s ter	-				198	1342	F	3.76	F	1.	*	<u> </u>	+	<u>-</u>  -	1
2	_2	->	<b>→</b>	_,	-	860	1341	<b> </b>	3.75	ļ,	1	1	<del> </del>	,	<u> </u> મ	_
>	By Y and a manually to the Y and	•	•										·	-	î	

\*\* X axis parallel to stream (+downstream, -upstream)

Y axis (+ right, -left, as viewed from the rear)

Z axis (+up, -down)

Taw a adiabatic wall temperature

C-3- 132

DR#1177

TABLE 2 - Continued

TEST CONDITIONS

TEST TITLE: AEDC-MSFC Phase B Heating Study - Thin-Skin Thermocouple Phase

TEST MUNBER: VT1162

TEST FACILITY: AEDC Tunnel B

TEST DATE: Nay 26-29, 1971

TEST ENGINEER: W. R. Martindale & R. K. Matthews

14         Booster         0         0         0         0         0         0         1347         1.00           15         15         1347         1347         1.00           15         15         1225         1           16         17         149         1225         1           17         17         149         1219         1           18         17         149         1219         1           19         60         60         8.00         857         1349         1           20         40         60         60         856         1342         1           21         40         60         60         1343         1           22         60         60         60         1343         1           23         20         20         856         1344         1           24         20         20         856         1342         1           25         30         20         857         1346         1           26         30         20         857         1342         1           26         30         15 <th>.%.</th> <th></th> <th>Model Configuration Id</th> <th>on Identification</th> <th>ation</th> <th>Model Scale</th> <th>Frec Stream Mach</th> <th>Total Pressure</th> <th>Total Temp.</th> <th>Taw • Ttotal</th> <th>RNX106</th> <th></th> <th>Booster Orbiter Spacing</th> <th>Booster- Orbiter</th> <th></th> <th>2 0 5 2 0 5</th> <th>Model Position</th> <th>6.0</th>	.%.		Model Configuration Id	on Identification	ation	Model Scale	Frec Stream Mach	Total Pressure	Total Temp.	Taw • Ttotal	RNX106		Booster Orbiter Spacing	Booster- Orbiter		2 0 5 2 0 5	Model Position	6.0
14         Booster         0<			·	°c	ô.		Number		•		•		P	2				;
15	=	Boos	ter	٥		8	8	95.5	1347	8	2 73			1		11	# ;	·   [•
150   1223   0.77	2						2 63	143	1226	<u> </u>	3,75	<u> </u>		·F	5	5	5-	<u> </u>
17       18       1219       0.77       18         18       60       8.00       657       1353       3.69       18         19       50       8.00       657       1340       3.74       18       18         20       40       857       1342       3.75       18	2	_			E	$oldsymbol{\perp}$		150	1227		0.70	7	#	+	1	寸	+	0
60   8.00   857   1353   3.69   1   1   1   1   1   1   1   1   1	ــــــــــــــــــــــــــــــــــــــ	-			1	T			532		<u>}</u>	1	7	$\dashv$		寸	<del>-</del> -	-5
60 8.00 857 1353 3.69	: :	+				-	*	149	1219		0.77			_		_	=	'n
40   857   1340   3.74	2	-		9			8.00	857	1353		3.69			-	Î			9
40   856   1342   3.73   m   1   1   1   1   1   1   1   1   1	6			20				355	1340		3.74	F	L	F	E	芉	‡	1 5
40 856 1342 3.73 m m m m m m m m m m m m m m m m m m m	ຂ			9		F		857	1338		3.76		F	$\overline{\Gamma}$	F	1	+	2 2
60 860 1343 3.75 m m	2			40		F		856	1342	E	2 73	$ar{I}$	Ŧ	Ŧ	,	#	+	, T
20 856 1344 3.73 0 pff   Dff	8			09				860	1343		3.75		F	F	5 6	+	-	9
20 856 1342 3.73	2			10				RSG	1344		3.73	F	F	$\vdash$	٤	‡	<u> </u>	2 5
30 J. 857 1346 3.72	72			20				856	1342	_	3 73		F	F		<del> </del>	<u> </u>	2 9
→ 30   15 → 857   1342 → 3.74 → 1.15	x			30	Ÿ			857	1346		3.72	F	F	F	$\Gamma$	丰	7.6	2 5
	8		<b>→</b>		-15	•	,	857	1342	,	3.74	ļ.,	‡,	Ţ	I	‡	#	ΣŢ.
	>	-	1. A. C. A. C	•	,	•												

X axis parallel to stream (+downstream, -upstream)
Y axis (+ right, -left, as viewed from the rear)
Z axis (+up, -down)

TABLE 2 - Continued

TEST CONDITIONS

TEST TITLE: AEDC-HSFC Phase B Heating Study - Thin-Skin Thermocouple Phase

TEST NUMBER: VT1162

TEST FACILITY: AEDC Tunnel B

TEST DATE: May 26-29, 1971

TEST ENGINEER. H. R. Martindale & R. K. Matthems

2.13			ſ										•			
%	Model Configuration Identification	atific	ation	Model Scalc	Free Stream	Total Pressure	Total Temp.	Taw .	RNX106	Phase Change	Booster- Orbiter	ter-		Model Position	Model Sitio	_ ē
		ؠ	Ş		Number		3			$\overline{\cdot}$	spacing (in.	5		(degrees)	a S	ន្ត
		· ]								(LE)	æ	02	GPLT	8	1	. •
27	Booster	30	15	900.0	8.00	.029	1342	8	3 74	N.A.		11-		,	1	;
28	Gnoster	0	0	-	L	Br.n	1343	-					5	<del> </del> <del> </del>	5	3
59	Orbi ter	Ŀ	F	1		200	200		3./4		_	_	_,	_	_	0
S		F	Ŧ	1	1	859	1339	_	3.76			Ë	ā	F	-	5
3   7		$\exists$	7		·	057	1337		3.76	H	+	T	ز	+	<del>,</del>	3   9
7						357	1343		2 23	+	‡	Ť	3	‡	‡	3
32		E	F	F		950		+	7.7	1	1		آة			37
2		Ŧ	+	1	1	000	2		3.74		_		Off	_	_	30
3 3		$\exists$	7			356	1343		3.73		F		<u> </u> -	Ė		<b>3</b>   §
7						858	1347		3 73	Ť	‡	#	Ť	‡		2
3						555	1305		2 53	1	+	#	Ť	+		5
ಕ್ಷ						553	E		5.5	#	+	1	Ť	$\pm$		3
37				F		25.5		†	,	†	#	#	Ì	=	=	용
38		F	丰	Ŧ	+		5	7	2.50	<b>-</b>		_	_			30
ક્ષ		Ŧ	十	Ť	#	254	1338		2.51						Ę	۶
	•	7	7	7		553	1307	<b>-</b> -	2.51	ļ,	F	t	‡	÷	1	Ţ
K K	X 2xis parallel to stroom 44 designed	7	1	1						*	>	_	_ ;	·		֝֝֝֝ <del>֚</del>

\* X axis parallel to stream (+downstream, -upstream)
Y axis (+right, -left, as viewed from the rear)

Tay a adiabatic wall temperature

Z axds (+up, -down)

C-3- 134

DR#1177

TABLE 2 - Concluded

TEST CONDITIONS

TIST TITLE: AEDC-HSFC Phase B Heating Study - Thin-Skin Thermocouple Phase

TEST MUNBER: VT1162

TEST FACILITY: AEDC Tunnel B

May 26-29, 1971 TEST DATE:

TEST ENGINEER: W. R. Martindale & R. K. Matthems

Run				Model	Pree	Total	Total	Taw .	RNX106	Phase	Boo	Booster-		ä	[sole]	Γ
%	Model Configuration is	Mentification	ation	Scale	Stream	Pressure	Temp.	Ttotal		Change		Orbiter Spacing (in.		<b>202</b>	Position (d) greek	e v
		١	Ĺ							Temp.						;
		ပ	္ပ		Number					(PF)	QX	20	G!! I	•	Ŧ	B
40	Orbiter	·	0	000.0	7.94	165	1254	8.	0.82	NA	•	,	0ff	0	10	2
.41						165	1237	E	0.83	_	F	L		F	F	5
42						166	1228		98.		$\vdash$	$oxed{L}$			$\frac{1}{1}$	2 2
43						167	1232		0.35		-				<del> </del>	5 6
44						167	1237		0.34				1		÷	
45						165	1241		0.83						÷	12
46					8.00	356	1324		3.81		H		E	1	Ė	<u> </u>
47						563	1335		3.79		$\vdash$	$ar{\pm}$	$\frac{1}{1}$	<del>-</del>	<del> </del>	?   -
48	·					198	1344		3.75		F		$\pm$		<del> -</del>	2 8
6						356	1342		3.74					Έ	Ι-	٤
S						856	1344		3.74		$\vdash$		ا ان ج		Ė	2
51	->		-10	Ĵ	<b>-</b>	858	1346	-	3.73	<b>—</b>	-,	<b> </b>	off	1	<del>  ,</del>	8
		_												]_	-	Γ
×:	xis parallel to stre	(+ dow	astre.	am ut	ım (+dowastream, -upstream)			Taw a at	adiabatic wall temperature	ill temp	12	١,		1	1	7

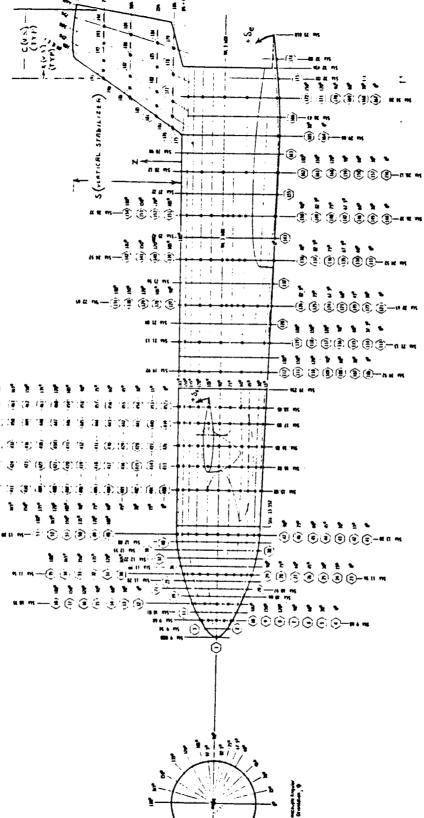
**36** 

\*\*\*Nose only

Y axis (+ right, - left, as viewed from the rear)

Z axis (+up, -down)

962



Booster Thermocouple Locations Figure 2.

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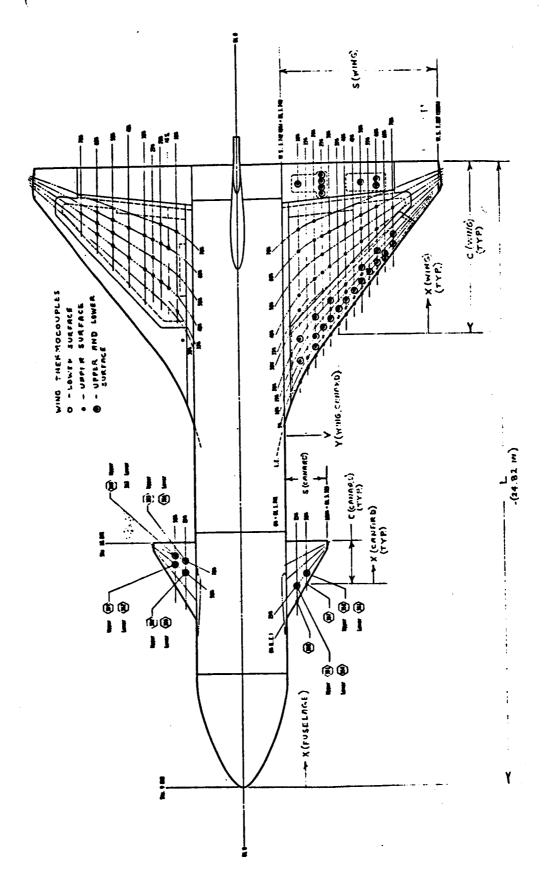
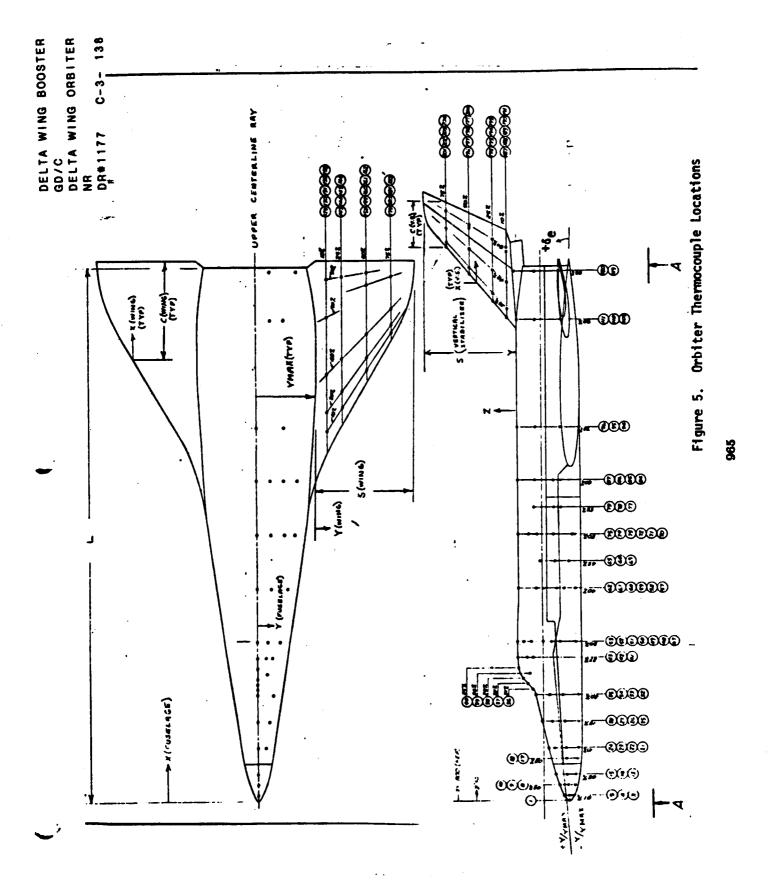


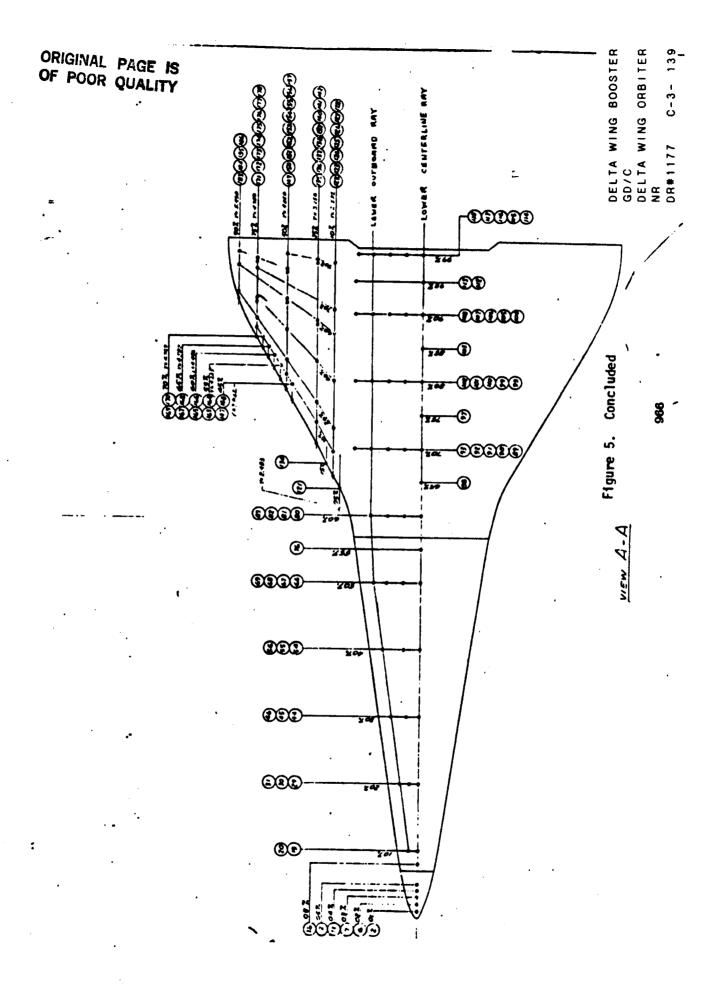
Figure 2. Continued

<b>E</b>		. =		W		ما• ه	PLE IDEN	tace	ION NUM	BERS	•	]		DELTA GD/C DELTA
۶-					,	6 Chord	<u> </u>		·			1		
% Span	0% (L.E.)	5%	10%	15%	20%	33%	40%	50%	- 60%	70%	81%	1		
10% Upper	200		201		202	203	204		205	206	207	1		
10% Lower			208		209	210				213	214	1		
15% Upper	215										1			
15% Lower		216					211		212		1			
20% Upper	217	218	219		220		221		222	223	1			
20% Lower		224	225		226		227		228	229	83.3%	86.7%	90.1%	93.5%
25% Upper	230		231				232	233	234		235	236 -	<b>237</b>	238
25% Lower		239	240				241	242	243		244	245	246	247
30% Upper	248		249		250		251		252			<del> </del>		
30% Lower		253	254	255	256		257		258		1			
35% Upper	259		260											
35% Lower		261	262								1			
40% Upper	263		264	•		•	265		266		1			
40% Lower		267	268	269	270		271		272					
45% Upper	273		274											
45% Lower		275	276								87.7%	]		
50% Upper	277		278		279		280	281	282		283			
50% Lower		284	255	286	257		288	289	290		291			
55% Upper	292		293									,		
55% Lower		294	295								82%	88.1%		
60% Upper	296		297		298		299		300		301	302		
60% Lower		303	304		305		306	307	308		309	310	-	
65% Upper		311	312										'	_
65% Lower		313	314										•	
70% Upper			315		316			317						
70% Lower			318		319			320			ŀ			

Figure 4. Concluded



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DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1264 C-3- 140

Table 3

## Phase change coating test data suddary sheet

TEST TITLE: Ascent Heat Transfer Test of GDC-8+HAR-DWO

VTT 162-11

TEST NUMBER:

June 1971

TEST FACILITY: VKF Tunnel B

TEST ENGINEER: R. K. Matthews & H. R. Martindale TEST DATE:

_		Model	25	Total	Total	Taw .	RNX106 Phase	Phase	8	Model Position	itto	
	Model Configuration Montification	Scale	Stream Mach	Pressure (psis)	Temp.		<b>E</b>	9	3	(degrees)	<u> </u>	Model Surface
	•		Number					(PF)	8	0	Ø	
لسا	GDC-B + NAR-DWO	0.013	8.0	592	1270	1.0	1.25	250	0	0	0	Side
_								125	0	$\vdash$	E	
								250	-5		上	
								125	-5			
								250	5			
				•	•		•	125	5			
				295	1310		2.55	275	0			
#							_	150	0		L	
								275	-5			
								150	-5		L	_
								300	5	H		
						-		150	5	$\vdash$	L	
	•	-	_	<b>-</b>	-	. V/N		1	ç		Ŀ	

\* Tay " adiabatic wall temperature \*\*0.F. = 011 Flow

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PHASE CHANGE COATING TEST DATA SUNDARY SHEET

TEST TITLE: Ascent Heat Transfer Test of GDC-8+NAR-DWO

VKF Tunnel B TEST FACILITY: VTI 162-11 TEST NUMBER:

June 1971 TEST DATE:

and W. R. Martindale . . R. K. Matthews TEST ENGINEER:

Surface Mode1 Side Model Position 0 8 0 0 (degrees) ४ 0 5 Change Temp. 0.F.\*\* Shatte Phase 0.F. Sha Sha RNX106 2.55 Taw . N/A Total Temp. (R) 1310 Pressure (Feise Total 267 Free Mach Number 8.0 Model Scale 0.013 Model Configuration Mentification GDC-B + NAR-DWO 9 260 258 241 240 259 192

• Taw :: adiabatic wall temperature ••0. F. = 0il Flow •••Sha = Shadowgraphs

DELTA WING BOOSTER GD/C DELTA WING ORBITER

NR DR#1264

C-3-

GD/C DELTA WING ORBITER NR DR#1264

C-3- 142

Table 3 Phase change coating test data sumary sheet

Ascent Heat Transfer Test of GDC-8 + NAR-DMO TEST TIFLE:

VT1162-11

June 1971

TEST DATE:

TEST NUMBER:

TEST ENGINEER: R. K. Matthews & W. R. Martindale TEST FACILITY: VKF Tunnel B

Surface Mode 1 Side 줟 Тoр **T**0 Model Position (degrees) Change Temp. Plase 113 113 200 150 113 200 125 133 52 2 RNX106 1.26 2.54 2 Taw . 0. Temp. 1270 Total 1315 Pressure (pela) Total 265 565 Free Stream Mach 8.0 Model Scale 0.013 Model Configuration Meutification 8-209

248

247

249

250

251

9 

244

245 243 696

246

5

113 125 . Taw .: adiabatic wall temperature

## ORIGINAL PAGE IS OF POOR QUALITY

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

Ascent Heat Transfer Test of GDC-B + NAR-DMO TEST TITLE:

TEST NUMBER:

TEST FACILITY: WKF Tunnel 8 W1162-11

June 1971 TEST DATE:

TEST ENGINEER: R. K. Matthews & W. R. Martindale

ģ	Model Configuration Mentification Scale	Model Scale	Pres S.	Total			RNX106	Phase	ž	- P	8	
			Mach	(Tela)	<b>P</b> (S)	- total	<b>x</b>	Change Temp.		(degrees)	<u> </u>	Model
			Tan mark					ج (ج	8	9	0	9
270	NAR-DWO	0.00	0	250							1	
,		2	9	ŝ	052	0	- 30 - 1	=	0	0	怒	Bottom
266		7	-					113	•			Side
		7	-					113	5-		F	Bottom
767		7	$\frac{1}{1}$	1	7			113	-		匚	Side
Ţ.		+	1					100	-5		F	Bottom
, s		+	1	1				150	1	F	L	Side
		7						125	2	F	上	Rottom
189		7	1					125	1.	丰	丰	Side
9%			-1	1	7	4	-	100	5			Bottom
2		0.013		266	1315	2	2.54	113	0		<b>-</b>	Bottom
22		†	1	7	7			113	-5		180	Bottom
1.		‡		1	7			100	-5			
1		4	+	+	<b>→</b>		1	55	<b> </b>	t	Ė	

970

Taw " adiabatic wall temperature

DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1264 C-3- 143

DELTA WING BOOSTER GD/C DELTA WING ORBITER NR DR#1264 C-3- 144

(

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

(

Ascent Heat Transfer Test of GDC-B + NAR-DMO TEST TITLE:

TEST ENGINEER: R. K. Matthews & W. R. Martindale VT1162-11 TEST NUMBER:

June 1971

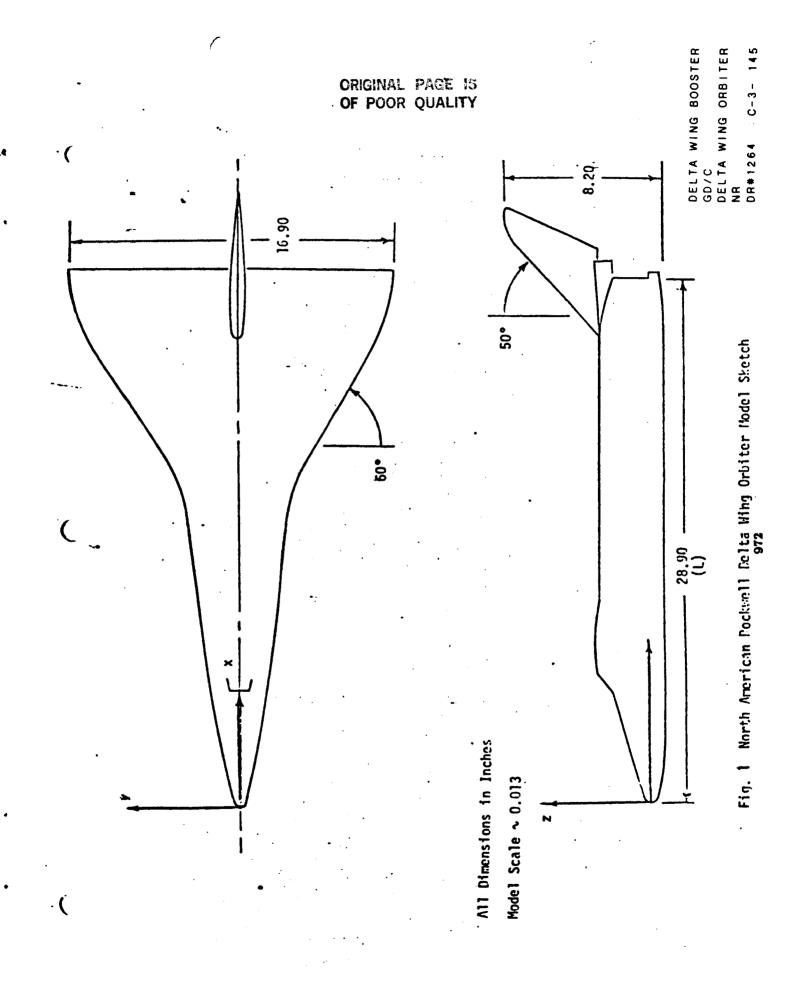
TEST DATE:

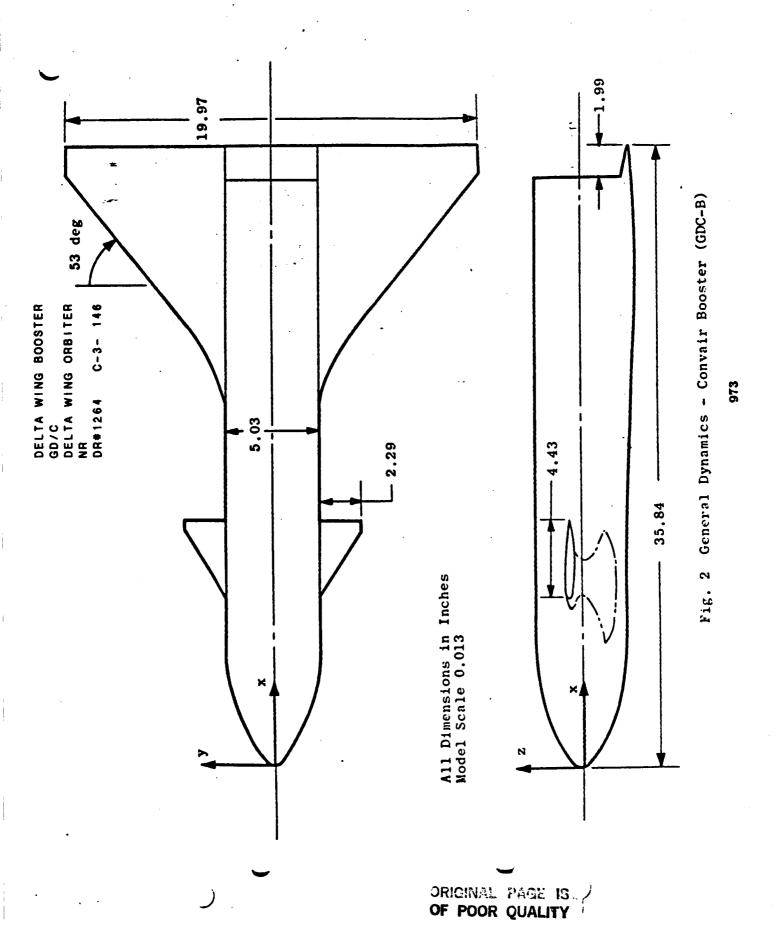
TEST FACILITY: VKF Tunnel 8

**Sottom/Side** 3ottom/Side 3ottom/Side Surface Mode1 Bottom Side 8 Model Position (degrees) 0 . Taw .: adiabatic wall temperature r ç 0 Change Temp. Phase 0.F. 13 113 RNX106 2.54 ۳ Total 0: Total Temp. 1315 Total Pressure (peis) 266 Mach Number Free Stream 8.0 Model Scale 0.013 Model Configuration Mentification NAR-DWO **2** 9. 28 28 28 28 28 273 288 272

971

\*\* Oil Flow

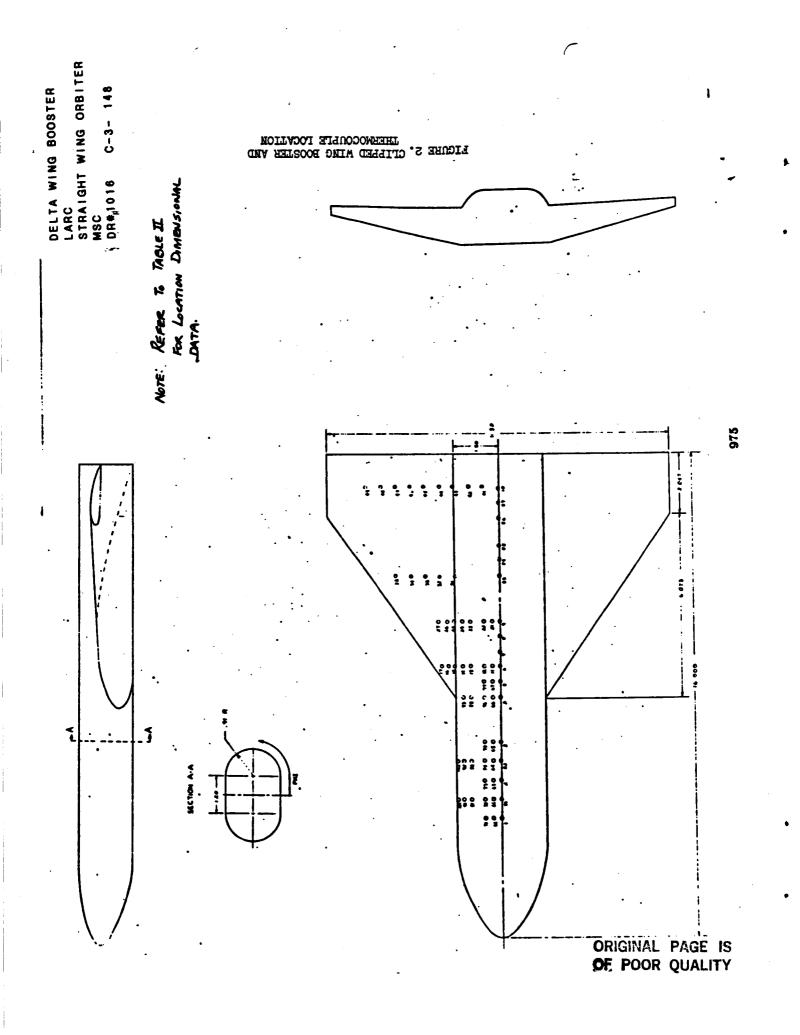


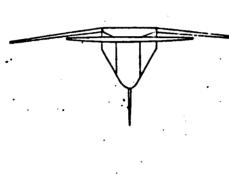


	7	F		7	<del> </del>	Ŧ		F	ru			ا	, AL	.11	T	Ħ		-						TER	ORBITER	i
		(13)	<b>€</b>	ter	ter	0.0"	0.0"	0.0"	ושו	0.240"	0.0"	0.240"	0.240"											WING BOOSTER	W I NG	:
		(12)	<b>∀</b> ·	No orb	orbi	2.5"	2.5"	2.5"	rbit	2.5"	-1.5"	-1.5"	-1.5"							. 1		,		DELTA WI	STRAIGHT	0
CRAWFORD		(11)	ROLL	0									>													
SONIC TU D. H.		(10)	<b>62</b> .	0		,							<del>&gt;</del>													
11" CONTINUOUS FLOW HYPERSONIC TURNEL TRANSFER - TEST ENGINEER: D. H. CRAW		(6)	ಕ	00	50	00	50	100	100	5,	50	50	100													
CONTINUOU ANSFER - TE		(8)	Tav	1.80																						
ᇧᄩ	1970	(7)	RN X 106	1.00	1.04	1.08	1.03	1.06	.966	1.08	1.01	.995	1.01				definition									
50 TEST FACILITY: LANGLEY THERMOCOUPLE CALORIMETRIC HEAT	August	(8)	TOTAL TEMPERAT- URE	1783.05	1782.19	1747.03	1762.47	1751.74	1816.93	1754.96	1781.33	1783.26	1780.05				4 for									
50 TEST 1	H.	(2)	TOTAL PRESSURE (ps1a)	750.12	779.06	775.75	753.97	767.48		780.71	750.67	744.05	749.29				FIGURE		-							
TEST NUMBER: TEST DATA: T	TEST DAT	(4)	FREE STREAM MACH NIMBER	10.36	10.36	10.36	10.35	10.36	10.35	10.36	10.35	10.35	10.35				* Sec	_								
日間	7	(3)	RUN NUMBER	-	2	7	5	9	- 6	20	6	22	=													!

TEST CONDITIONS

TABLE I





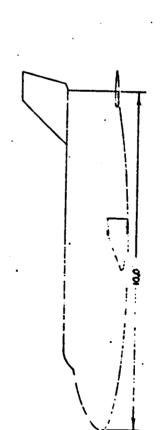
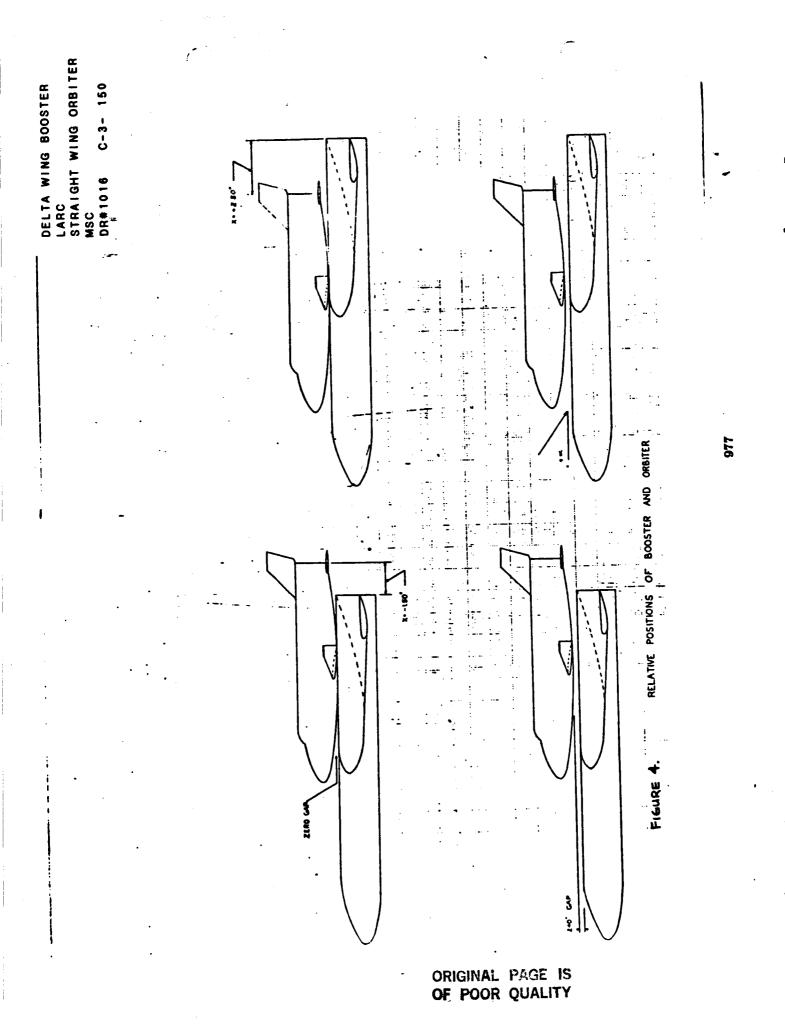


FIGURE 3. MSC ORBITER, 3-VIEW



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LMSC-A99

UNIQUE CONFIGS. BOOSTER LMSC DELTA BODY ORBITER LMSC DR#1143 C-3- 151

0 ,0662

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

LASC DELTA-BODY OFBITIER TEST TITLE: \_\_

TEST NUMBER, BUADTS-FRALLOS

LRC Mach 8 VDT TEST FACILITYS \_\_

TEST DATE \$/5/11 - 4/9/11

TEST ENGINEER Schultz and McGee

20	MODEL CONFIGURATION IDENTIFICATION	MODEL	FREE STREAM MACH	TOTAL PRESSURE (PSIA)	TOTAL TEMP.		RNX 10	PHASE CHNG	₹ Ö	MODEL	7:	4 B	
			NUMBER		?	7		EM		וחבטעבנאל			
								(°F)#	8	60	•	sec-ft2-og	٠,
3	12 fm. Orbiter	07700.	8.2	215	סופו	2000	-	,			$\parallel$		
92	1-1/2 Stage Ascent	MS:SA	9			.Ton-n	5.1	27	0		8	9660	
220	1 10 84	3		CTO	1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80	8	3.46	છ્વ	0	-	8	+ 4280	
9	The Section 1	.00578	8,7	815	1360	1.000	3.40	ž	6	,	†,	-	
9	12 in. Orbiter	02200	7.80	216	1960	1 2 2			,	,	5	.0863	
S)	12 in. Orbiter	33.1	8		7	1000	1.10	252	8	0	180	- 1660.	
8	12 tn. Orbitan	2	3	(17)	1325	*#88.0	1.01	175	20	0	180	.0305	
	Total	02/20	7.91	. 465	1270	\$188°0	2.26	175	S	+	16		
Ę	12 in. Orbiter	07.00	8	A) E	T	3			3	,	3	. 0562	
88	12 in. Orbiter		2 2	T	1	*# 00°0	3.68	225	ຂ	0	180	.0732.	
83		_	50.0	1	1405	*#88F*	88.	225	50	0	180	6890	
₹		-	3 3	215	P P	0.915*	1.09	225	Ŋ	0	180	2840	
8			8	335	285	0.915*	1.58	225	R	0	897	0562	
		00558	7.85	315	1270	0.015#	┪	٤	╁	+	L	, ,	
æ	9 in. Orbiter	00558	7.85	T	T		+	3	-¦		8	0562	
87	9 in. Orbiter		10	T	Т	305.0	₽. 1.	န္အ	ж	0	-	. 4250.	
		-1	7.	2/4	290	000.0	2.25	82	20	0	0	6990	
•									•	•			

\*Value of 0.900 was used for reduction of sideview data.

# Also walue used in h rel calculation.

## Table 1 (Cont'd) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

LASC DELLA-BOUT ORBITER TEST

TEST TITLE: \_\_

TEST NUMBER: INVOTS-RUALOS TEST FACILITY: LRC Mach 8 VDT

000 000 000 000 000 000 000 000 000 00	DENTIFICATION 9 14. Orbiter 9 1a. Orbiter	<u> </u>			ı	- F (					_ _	,
	<u> </u>		₹ 5	(MK)	(2)	TOTAL	 :	TEN C		(DEGREES)		P. 7-1-
	Orbiter Orbiter		NUMBER					(°F)#	8	8	•	
	Orbiter	.00558	7.98	815	1360	0.900	3.51	81	×	0	0	0859
		.00558	7.85	315	1340	<b>*016*0</b>	1.44	00¶	×	0,	စ္က	056h
	9 in. Orbiter	.00558	7.85	315	1310	006*0	1.50	00†	×	٥	0	.0564
_	9 in. Orbiter	.00558	7.85	315	1330	006.0	. 1.47	100	50	0	0	.055%
1	9 in. Orbiter	.00558	7.85	315	1300	0.900	1.51	<b>0</b> 0ф	20	0	0.	1950
093 9 in.	9 in. Orbiter	.00558	7.85	315	1285	0.900	1.4	100	25	0	0	-0552-
094 9 in.	9 in. Orbiter	.00558	7.85	315	1310	006.0	1.50	951	25	0	0	`# <b>5</b> 50•
095 9 in.	9 in. Orbiter	.00558	7.85	315	1280	006.0	1.55	100	35	0	0	.0551
096 9 ta.	9 in. Orbiter	.00558	7.85	315	1275.	006.0	1.56	100	Q T	0	0	.05511
097 9 tn.	9 in. Orbiter	.00558	7.85	315	1310	0.900	1.50	00 <del>1</del>	01	0	0	1,4950;
098 9 in.	9 in. Orbiter	.00558	7.85	315	1325	0.960	1.48	225	54	0	180	,05577
099 9 in.	9 in. Orbiter	.00558	7.80	215	1290	とる。	1.06	522	01	0	180	,0463 <u>3</u>
100 9 in.	9 in. Orbiter	.00558	7.80	215	1275	*9 <b>%</b> *0	1.09	225	35	0	180	· 0462 v

,\*Value of 0.900 was used for reduction of sideview data.

₱ Also value used in h<sub>-1</sub> calculation.

IMBC-A990

UNIQUE CONFIGS. BOOSTER

LMSC DELTA BODY ORBITER LMSC DR#1143 C-3- 153

TEST DATE 1/5/11 - 1/9/11

Schultz and McGee TEST ENGINEER.

LRC Mach 8 VDT

TEST FACILITY: \_

TEST NUMBER, RMOTS-RMA106

TEST TITLE:

PHASE CHANGE COATING TEST DATA SUMMARY SIIEET

LASC DELTA-BODE ORBITIER

Mable 1 (Cont'd)

<u>Z</u>	MODEL CONFIGURATION	MODEL	FREE	TOTAL	TOTAL TAW		RNX106 PILASE	PIIASE		MODEL		å
	DENTIFICATION		MACH	(PSIA)	(%)		Ė	TEM.	_	(DEGREES)	_ <u>_</u> _	E
			NUMBER					(°F)#	۵	β	•	sec-ft
5	94n. Orbiter	85500	7.80	215	1285	0.910*	1.08	225	30	0	<u>5</u>	
8	9 in. Orbiter	.00558	7.80	215	1280	0.80k*	1.8	225	, %	,	_L	
69	9 in. Orbiter	.00558	7.85	315	1270	0.884*	1.57	3	3 8	,	3 3	
Ö	12 in. Orbiter	01100.	2.7	115	1175	0.000	. 0.68	18	3	,	; }   c	200
ß	12 in. Orbiter	orroo.	7.85	315	1270	0.00	1.57	156	,	,	╬	
8	1-1/2 Stage Ascent	.00558	7.91	1465	1300	80.1	2.19	004	٩	-		2 3
ω	1-1/2 Stage Ascent	.00558	7.91	465	1310	980	2.16	8	1   2	,	3 2	.0073
										,	1	38
								1	1	1	1	
Γ												
T											$\vdash$	  -
		_	-						T	+	t	
						T		1	Ť	†	$\dagger$	
						1					-	
		_				_			_	L	L	

\*Value of 0.900 was used for reduction of sideview data. Also value used in h. calculation

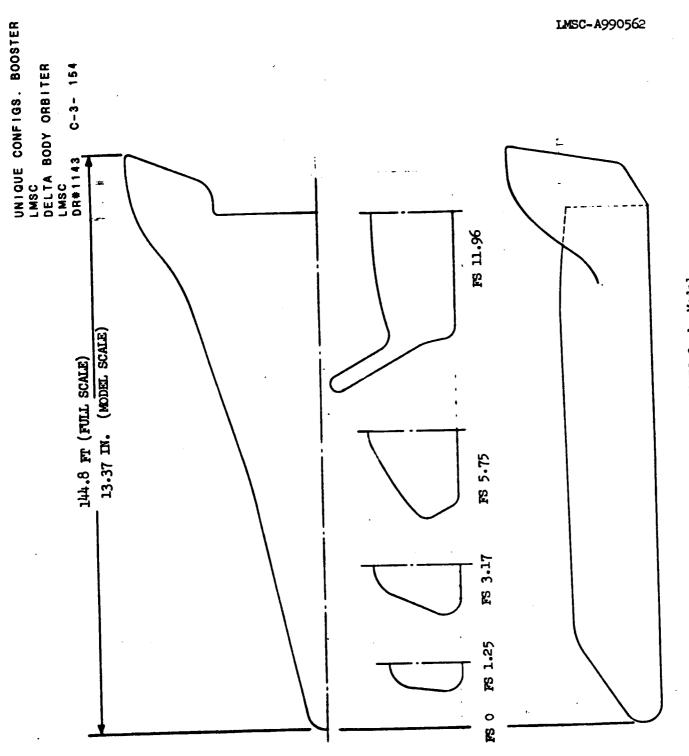
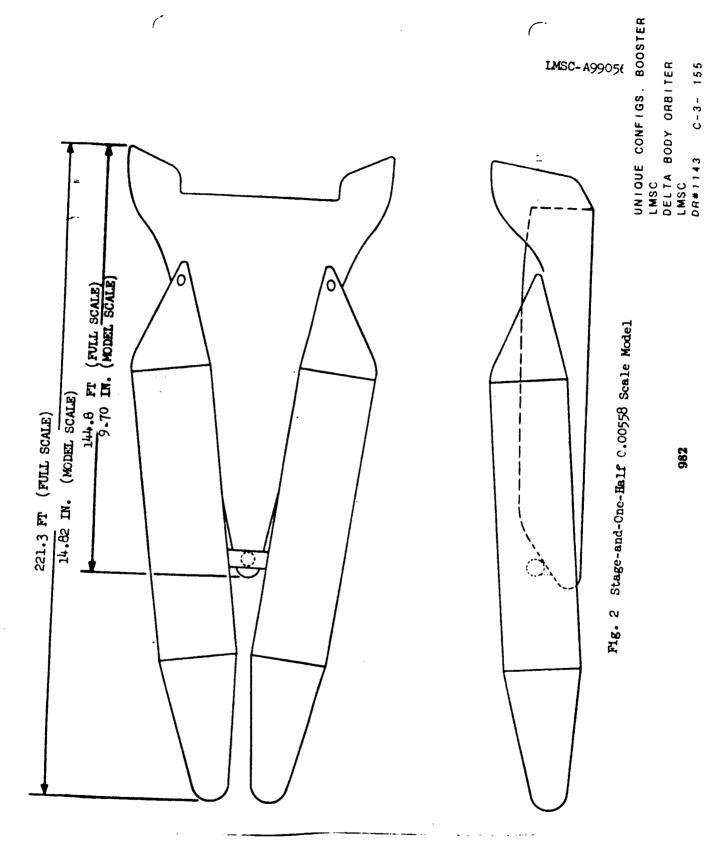


Fig. 1 Delta-Body Orbiter 0.00770 Scale Model

981

LOCKHEED MISSILES & SPACE COMPANY



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### Standard Bibliographic Page

	16 Dont 2	2. Government Accession No.	3. Recipient's Catalog No.
NASA CR-1784	to, rait 2		5. Report Date
SPACE SHUTTLE	E PHASE B WIND TUNNE	L MODEL AND	July 1988
TEST INFORMAT	TION, VOLUME 3 - LAU	JNCH CONFIGURATION	6. Performing Organization Code
. Author(s)			8. Performing Organization Report No.
J. L. Glynn	and D. E. Poucher		DMS-DB-02, Vol. 3
Performing Organiza	ation Name and Address		10. Work Unit No.
Chrysler Cor	poration Military-Pu	ublic Electronic Systems	506-40-11-08
Michoud Engi	neering Office		11. Contract or Grant No. NAS1-18276
New Orleans,	Louisiana 70189		13. Type of Report and Period Covered
12. Sponsoring Agency	Name and Address		Contractor Report
National Aer Langley Rese Hampton, VA	onautics and Space A arch Center 23665-5225	Administration	14. Sponsoring Agency Code
	nnical Monitor: Jame	es C. Young me 2 - NASA CR-178415	ORIGINAL PAGE IS OF POOR QUALITY
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